United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
North Carolina
Department of Natural
Resources and
Community Development,
North Carolina
Agricultural Research
Service, North Carolina
Agricultural Extension
Service, and Pender
County Board of
Commissioners

Soil Survey of Pender County, North Carolina

How To Use This Soil Survey

General Soil Map

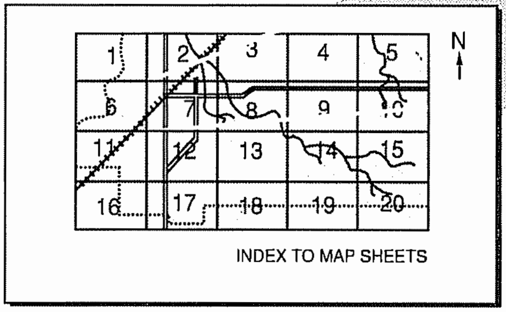
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

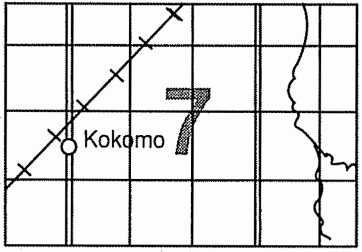
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



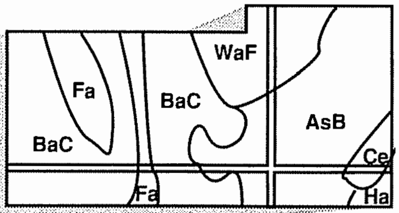
INDEX TO MAP SHEETS



MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.

MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1985. Soil names and descriptions were approved in 1986. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1985. This soil survey was made cooperatively by the Soil Conservation Service and the North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and the Pender County Board of Commissioners. It is part of the technical assistance furnished to the Pender County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

This survey updates the Pender County soil survey published in 1912. It also includes the Pender County part of the *Soil Survey of the Outer Banks of North Carolina* published in 1977 *(16)*.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: A typical beach setting in Pender County, North Carolina. An area of the Carteret-Newhan-Corolla general soil map unit is in the foreground.

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Foreword

This soil survey contains information that can be used in land-planning programs in Pender County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

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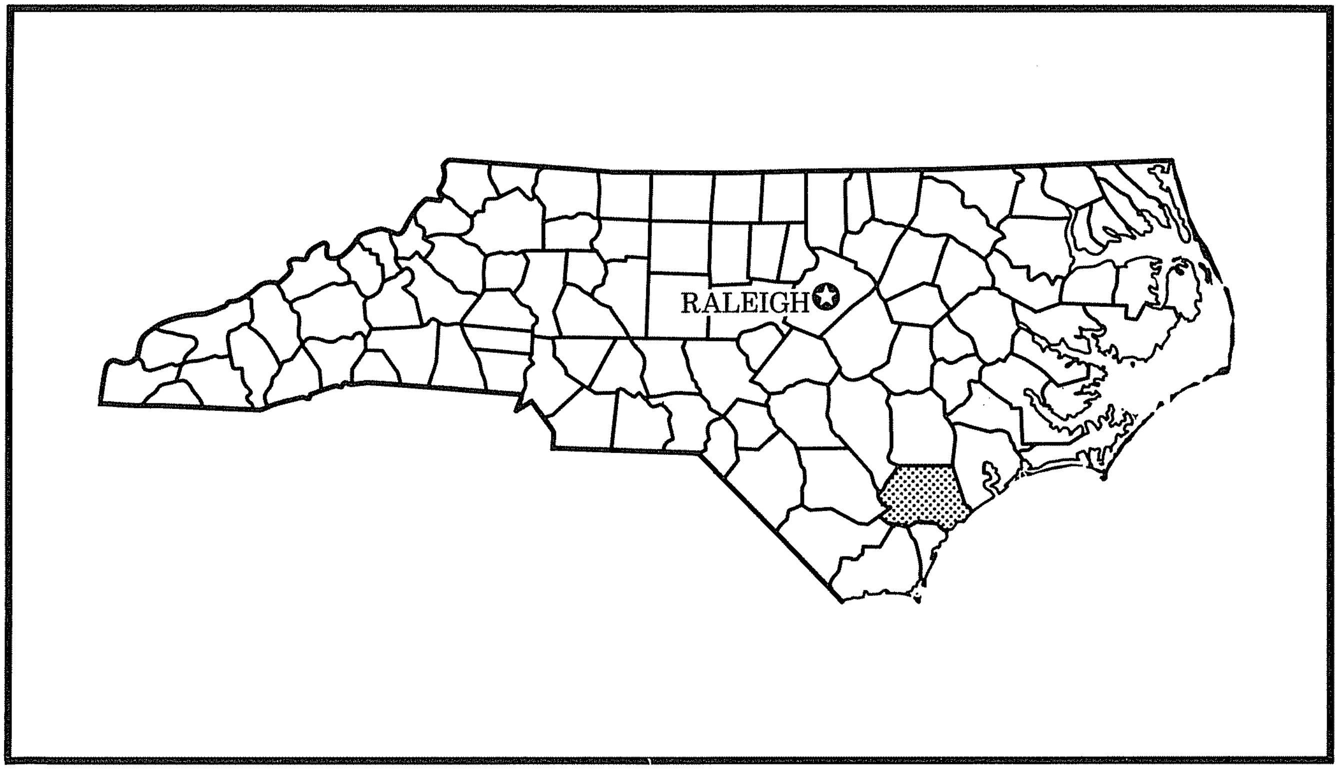
State Conservationist
Soil Conservation Service



Location of Pender County in North Carolina.

Soil Survey of Pender County, North Carolina

By William L. Barnhill, Soil Conservation Service

Soils surveyed by William L. Barnhill, Gina Bocetti, and David Clapp, Soil Conservation Service, and Vincent Lewis, North Carolina Department of Natural Resources and Community Development

United States Department of Agriculture, Soil Conservation Service,
in cooperation with
North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and Pender County Board of Commissioners

PENDER COUNTY is in the southeastern part of North Carolina, about 85 miles southeast of Raleigh, the state capital. It is bounded on the north by Duplin County; on the west by Sampson and Bladen Counties; on the south by Columbus, Brunswick, and New Hanover Counties; and on the east by Onslow County and the Atlantic Ocean. The total area of the county is 562,380 acres, or about 879 square miles.

General Nature of the County

This section provides general information concerning the history and economic development of Pender County and describes the land use; physiography, relief, and drainage; ground water supply; and climate of the county.

History and Economic Development

Pender County, established in 1875, was once part of New Hanover County. Early in the development of the county, naval stores were the main source of income. Lumber, shingles, and barrel staves were important wood products *(5)*. Now, the dominant wood products are pulpwood and sawtimber.

The first agricultural crops were corn or maize, beans, and potatoes, which were raised by the Indians. In 1725, the early settlers expanded farm produce to include rice, peanuts, wheat, and oats *(5)*. Tobacco, corn, soybeans, blueberries, and other truck crops became the main crops.

Today, fishing is a vital part of the economy in Pender County. The catch includes shellfish, such as shrimp, oysters, and clams, and fish, such as mullet, flounder, spot, and sea bass.

Tourism is also a factor in the economy of Pender County. The Topsail Island area and the area between U.S. Highway 17 and the Intracoastal Waterway are used for summer or year-round residences. The beach on the ocean side of Topsail Island is used for swimming, surfing, and pier fishing.

Land Use

The major land use in Pender County is woodland. About 459,089 acres, or 82 percent of the county, is commercial woodland *(17)*. The state of North Carolina owns about 62,748 acres, which is used for wildlife refuge. About 246,850 acres is privately owned land used as commercial and woodlot woodland. The paper industries own about 149,181 acres of woodland.

According to the 1982 Census of Agriculture, about 54,200 acres, or 10 percent of the county, is used as cropland. Corn, soybeans, tobacco, and peanuts are the main crops.

The rest of Pender County is made up of small bodies of water, urban areas, recreation areas, and other small, miscellaneous areas.

Physiography, Relief, and Drainage

Pender County is on the lower Coastal Plain and ranges in elevation from sea level to 110 feet. The soils in the county generally are nearly level and have short slopes along the main drainageways.

The Cape Fear River, which is in the southwest part of Pender County, drains most of the county. The Black and Northeast Cape Fear Rivers are tributaries of the Cape Fear River. The three rivers drain nearly all of the county. A few short streams in the southeast part of the county drain into the Intracoastal Waterway. The flow of water in streams throughout the county is slow, and small tributaries flow only after heavy rains.

The Cape Fear, Northeast Cape Fear, and Black Rivers are affected by tides. The few short streams in the southeast part of the county are wide and shallow near sea level and become narrow inland. Most of the flood plains along these streams are inundated each day at high tide.

The Outer Banks are a small part of Pender County. They generally are at an elevation of 0 to about 15 feet, but a few sand dunes reach about 40 feet. In most places the sand ridges are 200 to about 500 feet wide. Some ridges and dunes are stabilized by vegetation (fig. 1). The soils on the beach are gently sloping from the barrier ridge to the ocean. The soils on the northwest side of the islands slope gently toward the marshes or sounds that border the islands in places. The soils on the northwest side generally are less sloping than those in the middle and on the southeast side of the islands. The sand ridges of the Outer Banks protect the mainland from wave action and impede tidal action against the mainland shoreline.

The Outer Banks were formed by the waves, winds, longshore currents, tides and tidal currents, rivers, creeks that empty into the bays, the sounds, and the ocean. These continue to move sediment and to reshape the barrier islands, causing the islands to migrate or "roll over" toward the west and to move closer to the mainland.

Ground Water Supply

The ground water deposits in Pender County are mostly in unconsolidated surficial sediments *(4)*. Ground water from these sediments is of good quality but can have a high content of iron. Generally, the sediments vary in thickness throughout the county, ranging from only a few inches in the Rocky Point and Maple Hill area to about 40 feet in places. The sediments increase in thickness toward the southeast. They are a valuable aquifer that furnishes most of the water for rural residences.

In the eastern part of Pender County, the unconsolidated surficial sediments are underlain by a limestone aquifer that consists of beds of sand, marine shells, and some silt and clay. The marine shells are weathered but in most places can be recognized as shells. This aquifer is also an important source of good-quality water.

Immediately below the unconsolidated surficial sediments in the western part of the county and below the limestone aquifer in the eastern part is an aquifer of compacted, dark, silty and loamy material. In this formation ground water yields are low but of good quality *(9)*.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Willard, North Carolina, in the period 1951 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 46 degrees F, and the average daily minimum temperature is 34 degrees. The lowest temperature on record, which occurred at Willard on February 13, 1973, is 2 degrees. In summer the average temperature is 78 degrees, and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred at Willard on June 26, 1954, is 104 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 53 inches. Of this, nearly 32 inches, or about 60 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 26 inches. The heaviest 1-day rainfall during the period of

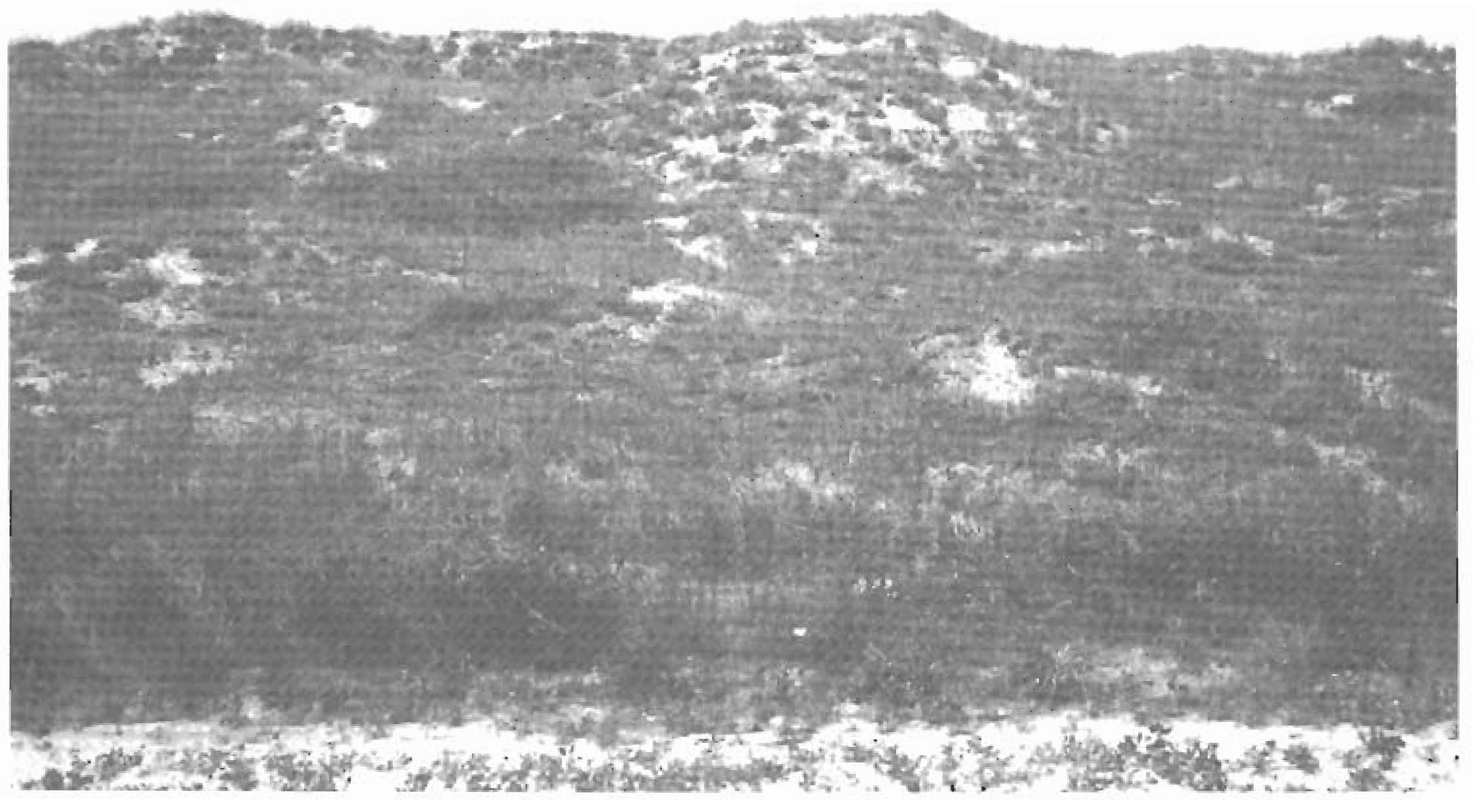


Figure 1.—A plant cover helps to stabilize the ridges and dunes in an area of Newhan soils on the Outer Banks.

record was 6.34 inches at Willard on November 6, 1977. Thunderstorms occur on about 46 days each year.

The average seasonal snowfall is 3 inches. The greatest snow depth at any one time during the period of record was 12 inches.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 65 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 11 miles per hour, in spring. Every few years, a hurricane crosses the county.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; and the kinds of crops and native plants growing on the soils. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, distribution of plant roots, soil reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are identified in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Dominantly Very Poorly Drained to Moderately Well Drained Soils; on the Uplands and Stream Terraces

The soils in these four map units make up about 54 percent of Pender County. These soils are used mainly as woodland, and a few areas are used as cropland. A seasonal high water table is the main limitation affecting woodland and cropland. In low-lying areas or depressions, some of these soils are ponded for brief periods.

1. Murville-Croatan-Torhunta

Nearly level, very poorly drained soils that have a mucky or loamy surface layer and a sandy or loamy subsoil

These soils are mainly in the large interstream areas in the eastern part of the county. Typically, the mapped areas are rounded or oblong. The slopes range from 0 to 2 percent.

This map unit makes up about 26 percent of the county. It is about 42 percent Murville soils, 40 percent Croatan soils, 15 percent Torhunta soils, and 3 percent soils of minor extent.

The Murville soils have a surface layer of muck about 3 inches thick. The subsoil is fine sand.

The Croatan soils have a surface layer of muck about 35 inches thick. The underlying material is fine sandy loam and sandy clay loam.

The Torhunta soils have a surface layer of mucky fine sandy loam. The subsoil is fine sandy loam.

The soils of minor extent are Leon, Woodington, Rains, and Pantego soils. Leon soils are on low ridges. Woodington and Rains soils are on the edges of shallow drainageways. Pantego soils are near the outer edge of the map unit.

The soils in this map unit are used mostly as woodland. Seasonal wetness, seedling mortality, nutrient deficiencies, and low soil strength that restricts the use of logging equipment are the main limitations affecting woodland management. Many large tracts have been ditched, clearcut, bedded, fertilized, and planted to loblolly pine.

In a few areas in this map unit, the soils are used as cropland. Seasonal wetness, low soil strength that restricts the use of equipment, and nutrient deficiencies are the main limitations. In these areas, drainage systems have been installed to reduce wetness.

The soils in this map unit generally are not used for building site development, sanitary facilities, or recreation areas. Seasonal wetness and low soil strength are the main limitations. Flooding is a hazard.

2. Rains-Woodington-Liddell

Nearly level, poorly drained soils that have a loamy surface layer and a loamy subsoil

These soils are in broad, smooth interstream areas of the county. The mapped areas are irregular in shape. The slopes range from 0 to 2 percent.

This map unit makes up about 19 percent of the county. It is about 40 percent Rains soils, 24 percent Woodington soils, 24 percent Liddell soils, and 12 percent soils of minor extent.

The Rains soils are in broad, smooth interstream areas and in shallow depressions on slightly convex divides. These soils have a fine sandy loam surface layer and a sandy clay loam subsoil.

The Woodington soils are in broad, smooth interstream areas and in shallow depressions on slightly convex divides. These soils have a fine sandy loam surface layer and subsoil.

The Liddell soils are in broad, smooth interstream areas. These soils have a silt loam surface layer and subsoil.

The soils of minor extent are Pantego, Torhunta, Goldsboro, Foreston, Grifton, and Grantham soils. Pantego and Torhunta soils are intermingled with the major soils in areas throughout this map unit. Goldsboro and Foreston soils are near shallow drainageways. Grifton soils are intermingled with the major soils in areas near Maple Hill, and Grantham soils are intermingled in areas near Burgaw.

The soils in this map unit are used mainly as woodland. Seasonal wetness is the main limitation affecting the use of logging and tree-planting equipment. Many tracts have been drained, clearcut, bedded, and planted to loblolly pine.

In many small areas and a few large areas in this map unit, the soils are used as cropland. Seasonal wetness is the main limitation. Drainage systems, such as land grading that improves surface drainage, tile drains, and open ditches, have been used in these areas to reduce wetness.

The soils in this map unit generally are not used for building site development, sanitary facilities, or recreation areas. Seasonal wetness is the main limitation. Most residential sites in this map unit are on the minor soils that are better drained. On the major soils, land grading that improves surface drainage, tile drains, and open ditches are needed to reduce wetness.

3. Leon-Mandarin

Nearly level, poorly drained and somewhat poorly drained soils that are sandy throughout

Most of these soils are in the southeastern part of the county. Typically, the mapped areas are irregular in shape. The slopes range from 0 to 2 percent.

This map unit makes up about 7 percent of the county. It is about 76 percent Leon soils, 13 percent Mandarin soils, and 11 percent soils of minor extent.

The Leon soils are poorly drained. They are in broad, smooth interstream areas and generally are in the more nearly level areas. These soils are fine sand throughout. The subsoil is weakly cemented.

The Mandarin soils are somewhat poorly drained. They are on slightly convex interstream divides. These soils have a surface layer of fine sand. The subsoil is weakly cemented.

The soils of minor extent are Kureb, Murville, Torhunta, Croatan, Alpin, and Pactolus soils. Kureb soils are on sand ridges. Murville, Torhunta, and Croatan soils are in depressions. Alpin and Pactolus soils are in nearly level and gently sloping areas near drainageways.

The soils in this map unit are used mostly as woodland. Seasonal wetness, the weakly cemented subsoil, summer droughtiness, and the sandy surface layer are the main limitations affecting woodland management.

A few areas in this map unit have been cleared and drained for blueberry production. The seasonal high water table, the weakly cemented subsoil, and leaching of plant nutrients are the main limitations.

The soils in this map unit generally are too wet for building site development, sanitary facilities, or recreation areas. Artificial drainage only partly corrects the wetness. The weakly cemented subsoil, ditchbank caving, and seepage are continuing limitations.

4. Grifton-Meggett-Invershiel

Nearly level, poorly drained and moderately well drained soils that have a sandy or loamy surface layer and a loamy or clayey subsoil

These soils are on broad, smooth interstream divides and in slight depressions in Maple Hill and Rocky Point. The mapped areas are irregular in shape. The slopes range from 0 to 2 percent.

This map unit makes up about 2 percent of the county. It is about 67 percent Grifton soils, 17 percent Meggett soils, 8 percent Invershiel soils, and 8 percent soils of minor extent.

The Grifton soils are poorly drained. They are in broad, smooth interstream areas and in shallow depressions on slightly convex divides. These soils have a loamy fine sand surface layer. The subsoil is sandy clay loam and sandy loam.

The Meggett soils are poorly drained. They are in shallow depressions. These soils have a loam surface layer. The subsoil is clay loam, sandy clay, and clay.

The Invershiel soils are moderately well drained. They are on broad, smooth, slightly convex divides. These soils have a loamy sand surface layer. The subsoil is clay loam and clay.

The soils of minor extent are Pender, Rains, Pantego, and Autryville soils. Pender, Rains, and

Pantego soils are intermingled with the major soils in areas throughout the map unit. Autryville soils are near drainageways.

The soils in this map unit are used mainly as woodland. Seasonal wetness is a limitation affecting the use of logging and tree-planting equipment. Many large tracts have been drained, clearcut, bedded, and planted to loblolly pine.

A few large areas in this map unit are used as cropland. Seasonal wetness is the main limitation. Wetness is reduced by land grading that improves surface drainage, tile drains, and open ditches.

The soils in this map unit generally are not used for building site development, sanitary facilities, or recreation areas. Seasonal wetness, a high shrink-swell potential, and slow permeability are the main limitations.

Dominantly Excessively Drained to Somewhat Poorly Drained Soils; on the Uplands and Terraces

The soils in these three map units make up about 33 percent of Pender County. These soils are used mainly as woodland and cropland. A few of these soils are used for urban development. Droughtiness and leaching of plant nutrients are the main limitations affecting woodland and cropland. A seasonal high water table also is a limitation in some of the soils.

5. Goldsboro-Norfolk-Exum

Nearly level to gently sloping, moderately well drained and well drained soils that have a sandy or loamy surface layer and a loamy subsoil

These soils are on slightly convex divides near the major drainageways in the western and central parts of the county. The mapped areas are long and irregular in shape. The slopes range from 0 to 6 percent.

This map unit makes up about 15 percent of the county. It is about 33 percent Goldsboro soils, 25 percent Norfolk soils, 13 percent Exum soils, and 29 percent soils of minor extent.

The Goldsboro soils are nearly level and moderately well drained. They are on slightly convex divides near shallow drainageways and in interstream areas. These soils have a fine sandy loam surface layer and a sandy clay loam subsoil.

The Norfolk soils are nearly level to gently sloping and are well drained. They are on slightly convex divides near the major drainageways. These soils have a loamy fine sand surface layer. The subsoil is sandy clay loam and sandy loam.

The Exum soils are nearly level and moderately well drained. They are on slightly convex divides near shallow drainageways and in interstream areas. These soils have a loam surface layer. The subsoil is loam and clay loam.

The soils of minor extent are Aycock, Johns, Kalmia, Onslow, Marvyn, Craven, Grantham, Rains, Woodington, and Muckalee soils. Aycock and Onslow soils are intermingled with the major soils in some areas of this map unit. Johns and Kalmia soils are on terraces. Marvyn and Craven soils are on side slopes. Grantham, Rains, and Woodington soils are in small, shallow depressions. Muckalee soils are in narrow drainageways.

A few large tracts in this map unit have been clearcut, bedded, and planted to loblolly pine. The remaining woodland supports naturally seeded trees. Few limitations affect woodland management.

Most of the soils in this map unit are used as cropland. Seasonal wetness is a limitation if the Goldsboro and Exum soils are used for crops that require a continuously aerated root zone. Seasonal wetness can be reduced by land grading that improves surface drainage, tile drains, and open ditches. The gently sloping Norfolk soils are susceptible to erosion. The hazard of erosion can be reduced by contour cultivation, cover crops, and conservation tillage.

These soils are used for building site development, sanitary facilities, or recreation areas. Seasonal wetness is a limitation affecting sanitary facilities. Wetness can be reduced by installing surface and subsurface drainage systems.

6. Foreston-Autryville-Baymeade

Nearly level to gently sloping, moderately well drained and well drained soils that have a sandy surface layer and a loamy or sandy subsoil

These soils are mainly near the major drainageways in the county. Typically, the mapped areas are long and narrow. The slopes range from 0 to 4 percent.

This map unit makes up about 10 percent of the county. It is about 37 percent Foreston soils, 27 percent Autryville soils, 18 percent Baymeade soils, and 18 percent soils of minor extent.

The Foreston soils are nearly level and moderately well drained. They are on slightly convex interstream divides. These soils have a loamy fine sand surface layer. The subsoil is fine sandy loam.

The Autryville soils are gently sloping and well drained. They are on convex divides near drainageways. These soils have a thick surface layer of fine sand. The subsoil is fine sandy loam, loamy fine sand, and fine sand.

The Baymeade soils are gently sloping and well drained. They are on low ridges and convex divides near drainageways. These soils have a thick surface layer of fine sand. The subsoil is fine sandy loam.

The soils of minor extent are Marvyn, Craven, Onslow, Kenansville, Kalmia, Goldsboro, Pactolus, Muckalee, Woodington, and Leon soils. Marvyn and Craven soils are on short side slopes along drainageways. Onslow and Goldsboro soils are intermingled with the major soils in nearly level areas throughout the map unit. Kenansville, Kalmia, and Pactolus soils are on terraces. Muckalee soils are in narrow, wet drainageways. Woodington and Leon soils are in depressions.

About two-thirds of the areas in this map unit are used as woodland. Summer droughtiness increases seedling mortality, and the sandy surface layer is a limitation affecting equipment use on the Autryville and Baymeade soils.

About one-third of the areas in this map unit are used as cropland. Seasonal wetness is a limitation if the Foreston soils are used for crops that require a continuously aerated root zone. Wetness is reduced by land grading that improves surface drainage, tile drains, and open ditches. The main limitations of the Autryville and Baymeade soils are droughtiness and the leaching of plant nutrients. Soil blowing is a hazard. Cover crops, crop residue management, and conservation tillage conserve moisture and reduce leaching. The hazard of soil blowing is reduced by windbreaks.

A few areas of the soils in this map unit are used for building site development, sanitary facilities, or recreational development. Seasonal wetness is a limitation affecting sanitary facilities on the Foreston soils. Wetness is reduced by installing a surface and subsurface drainage system. Seepage, ditchbank caving, and droughtiness are limitations in areas of the Autryville and Baymeade soils.

7. Alpin-Pactolus-Kureb

Nearly level to gently sloping, excessively drained and moderately well drained to somewhat poorly drained soils that are sandy throughout

These soils are mainly in the southeastern, southern, and western parts of the county. Typically, the mapped areas are long and narrow. The slopes range from 0 to 6 percent.

This map unit makes up about 8 percent of the county. It is about 48 percent Alpin soils, 36 percent Pactolus soils, 8 percent Kureb soils, and 8 percent soils of minor extent.

The Alpin soils are gently sloping and excessively drained. They are on the uplands and terraces. These soils are fine sand throughout, except for a few thin layers of loamy fine sand between depths of 42 and 75 inches.

The Pactolus soils are nearly level and moderately well drained or somewhat poorly drained. They are in slight depressions on the uplands and terraces. These soils are fine sand throughout.

The Kureb soils are gently sloping and excessively drained. They are in upland interstream areas. The surface layer is fine sand. The subsoil is fine sand that has dark reddish brown concretions and streaks.

The soils of minor extent are Leon, Mandarin, Kenansville, Baymeade, and Murville soils. Leon, Mandarin, and Murville soils are in depressions. Kenansville and Baymeade soils generally are near drainageways.

The soils in this map unit are used mainly as woodland. Seedling mortality and the thick layers of sandy material are the main limitations affecting woodland management.

A few areas of Alpin and Pactolus soils are used as cropland. Droughtiness and leaching of plant nutrients are the main limitations. Soil blowing is a hazard. Cover crops and crop residue management will conserve moisture and reduce leaching. Windbreaks will reduce the hazard of soil blowing.

A few areas of these soils are used for building site development, sanitary facilities, or recreational develpment. In the southeastern part of the county, development of sites for summer houses and retirement homes is an important land use. The main limitations are seepage, a poor filtering capacity, ditchbank caving, droughtiness, and the thick layers of sandy material. Seasonal wetness is the main limitation affecting septic tank absorption fields in areas of the Pactolus soils. A drainage system that includes land grading that improves surface drainage, tile drains, and open ditches will reduce the wetness.

Dominantly Somewhat Poorly Drained to Very Poorly Drained Soils; on the Flood Plains

The soils in these two map units make up about 11 percent of Pender County. These soils are used mainly as woodland. Flooding is a hazard, and a seasonal high water table is the main limitation affecting woodland.

8. Muckalee-Dorovan

Nearly level, poorly drained and very poorly drained soils that have a loamy surface layer underlain by a loamy and sandy material or are sapric material (muck)

These soils are along all of the major streams in the county, except for the Cape Fear River. The mapped areas are long and narrow. The slopes range from 0 to 2 percent.

This map unit makes up about 9 percent of the county. It is about 60 percent Muckalee soils, 22 percent Dorovan soils, and 18 percent soils of minor extent.

The Muckalee soils are poorly drained. They are on the narrow flood plains. These soils have a loam surface layer. The underlying material is sandy loam and loamy sand.

The Dorovan soils are very poorly drained. They are on the low flood plains. These soils are made up of well decomposed organic matter more than 51 inches thick. They are underlain by loamy sand.

The soils of minor extent are Johns, Lumbee, Grifton, and Pactolus soils. These soils are in narrow, irregularly shaped, slightly elevated areas on terraces. Pactolus soils also are in long, narrow areas along the flood plains and stream channels.

The soils in this map unit are used mostly as woodland. Frequent flooding is a hazard, and a high water table is the main limitation affecting woodland.

The soils in this map unit generally are not used for crops, building site development, sanitary facilities, or recreation areas because of wetness and frequent flooding. They are used as habitat for wetland wildlife and provide an excellent environment for wetland plants.

9. Chewacla-Chastain

Nearly level, somewhat poorly drained and poorly drained soils that have a loamy surface layer and a loamy subsoil

These soils are along the Cape Fear River. The mapped areas are long and broad. The slopes range from 0 to 2 percent.

This map unit makes up about 2 percent of the county. It is about 60 percent Chewacla soils, 26 percent Chastain soils, and 14 percent soils of minor extent.

The Chewacla soils are somewhat poorly drained. They are on the flood plains. These soils have a loam surface layer. The subsoil is loam, fine sandy loam, and clay loam. The substratum is loamy sand.

The Chastain soils are poorly drained. They are in slight depressions on the flood plains. These soils have a loam surface layer. The subsoil and substratum are clay loam, loamy sand, and sand.

The soils of minor extent are Altavista, Pactolus, Muckalee, and Dorovan soils. Altavista and Pactolus soils are in narrow, irregularly shaped, slightly elevated areas on the flood plains and along stream channels. Muckalee and Dorovan soils are near tributary streams.

The soils in this map unit are used mostly as woodland. Frequent flooding is a hazard, and a high water table is the main limitation affecting woodland.

The soils in this map unit generally are not used for crops, building site development, sanitary facilities, or recreation areas because of frequent flooding and wetness. They are used as habitat for wetland wildlife and provide an excellent environment for wetland plants.

Dominantly Excessively Drained, Moderately Well Drained to Somewhat Poorly Drained, and Very Poorly Drained Soils; on the Outer Banks and in the Tidal Marshes

The soils in this map unit make up about 2 percent of Pender County. They are used mainly for building site development, as recreation areas, or as habitat for wildlife. Wetness, slope, and thick layers of sandy material are the main limitations, and flooding is a hazard.

10. Carteret-Newhan-Corolla

Nearly level to moderately steep, very poorly drained, excessively drained, and moderately well drained to somewhat poorly drained soils that are sandy throughout

These soils are in the coastal areas of the county. Typically, the mapped areas are long and narrow and have a maritime environment. The slopes range from 0 to 30 percent.

This map unit makes up about 2 percent of the county. It is about 65 percent Carteret soils, 15 percent Newhan soils, 7 percent Corolla soils, and 13 percent soils of minor extent.

The Carteret soils are nearly level and very poorly drained. They are on tidal flats bordering the sound. These soils are flooded by high tides daily. They are dominantly fine sand or sand throughout.

The Newhan soils are gently sloping to moderately steep and are excessively drained. They are on coastal ridges and barrier dunes. These soils are fine sand or sand throughout.

The Corolla soils are nearly level and are moderately well drained or somewhat poorly drained. They are in depressions. These soils are fine sand or sand throughout.

The soils of minor extent are Bohicket soils adjacent to streams that drain from the mainland and some small

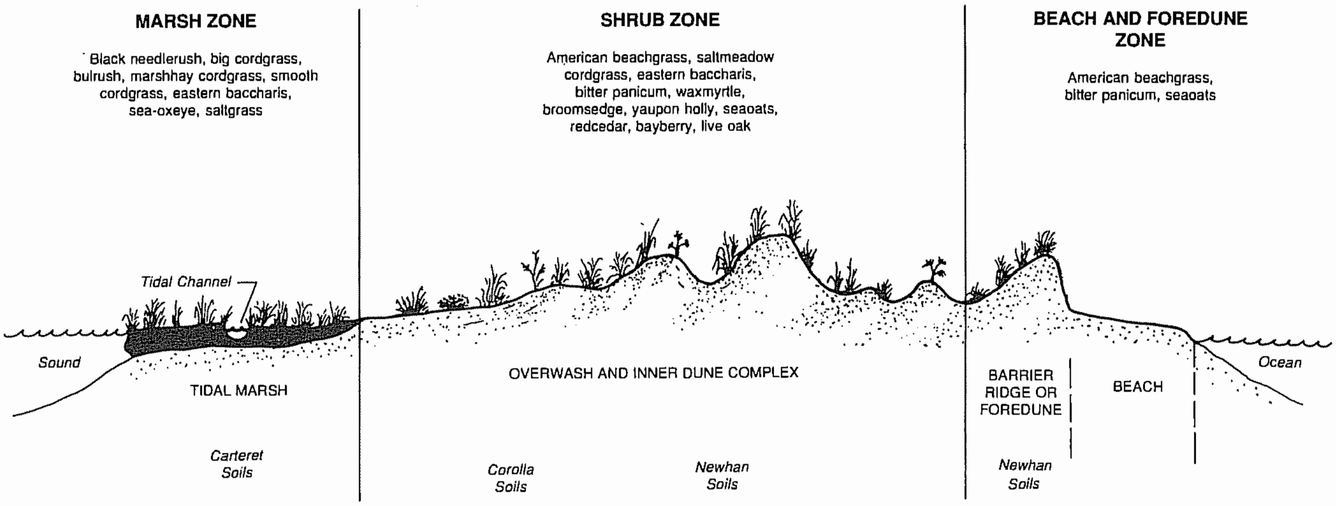

MARSH ZONE
Black needlerush, big cordgrass, bulrush, marshhay cordgrass, smooth cordgrass, eastern baccharis, sea-oxeye, saltgrass
SHRUB ZONE
American beachgrass, saltmeadow cordgrass, eastern baccharis, bitter panicum, waxmyrtle, broomsedge, yaupon holly, seaoats, redcedar, bayberry, live oak
BEACH AND FOREDUNE ZONE
American beachgrass, bitter panicum, seaoats
Tidal Channel
Sound
TIDAL MARSH
OVERWASH AND INNER DUNE COMPLEX
BARRIER RIDGE OR FOREDUNE
BEACH
Ocean
Carteret Soils
Corolla Soils
Newhan Soils
Newhan Soils

Figure 2.—Relationship of dominant vegetation, landscape, and soils in the Carteret-Newhan-Corolla general soil map unit.

areas of organic soils near the edge of the mainland. Areas of urban land are intermingled throughout this map unit, and beaches are along the seaward edge.

Most of the areas of the Newhan and Corolla soils in this map unit are sparsely vegetated with beachgrass, seaoats, waxmyrtle, redcedar, and yaupon. The Carteret soils support tidal marsh plants, such as cordgrass, needlegrass rush, bulrush, sea oxeye, and saltgrass (fig. 2).

The Newhan and Corolla soils are used for recreational development, building site development, or sanitary facilities. The slope, the sandy texture, seepage, a poor filtering capacity, and droughtiness are the main limitations. Ditchbank caving is a hazard. In addition, wetness is a limitation in the Corolla soils. The Carteret soils are not used for building site development, sanitary facilities, or recreation areas. These soils are important as habitat for wetland wildlife, and they provide an excellent environment for tidal marsh plants.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Norfolk loamy fine sand, 0 to 2 percent slopes, is a phase of the Norfolk series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Newhan-Corolla complex, 0 to 30 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Marvyn and Craven soils, 6 to 12 percent slopes, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

AnB—Alpin fine sand, 1 to 6 percent slopes. This soil is excessively drained. It is on uplands and stream terraces near the coast and on terraces along the Cape Fear, Northeast Cape Fear, and Black Rivers. The mapped areas generally are round and range from 50 to 250 acres.

Typically, the surface layer is gray fine sand about 5 inches thick. The upper part of the subsurface layer, to a depth of about 42 inches, is brownish yellow fine sand. The lower part, to a depth of about 75 inches, is very pale brown fine sand with thin bands of brownish yellow loamy fine sand. In places, the soil does not have thick bands of loamy fine sand.

Infiltration is rapid, and surface runoff is slow. Permeability is rapid in the upper part of the subsurface layer and moderately rapid in the lower part. The available water capacity is low. The soil is very strongly acid to slightly acid except where lime has been added to the surface layer. The seasonal high water table is below a depth of 6 feet.

Included with this soil in mapping are a few small areas of Autryville, Kureb, Mandarin, Muckalee, and Pactolus soils. Autryville and Kureb soils are in small areas intermingled throughout the map unit. Autryville soils are well drained and have a loamy subsoil. Kureb soils have dark reddish brown concretions in the subsoil. Mandarin and Pactolus soils are in some of the narrow depressions. Mandarin soils are somewhat poorly drained, and Pactolus soils are moderately well drained or somewhat poorly drained. Muckalee soils are in narrow, wet drainageways and are poorly drained. Also included, along the Northeast Cape Fear River, are narrow bands of Alpin soils that have short slopes of more than 6 percent. The included soils make up about 15 percent of this map unit.

This Alpin soil is used mainly as woodland. In a few small areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are longleaf pine, loblolly pine, southern red oak, post oak, blackgum, and hickory. The understory is turkey oak, blackjack oak, sassafras, bluejack oak, persimmon, live oak, blueberry, inkberry, huckleberry, pineland threeawn, American beautyberry, poison ivy, Virginia creeper, and various panicums and lichens. Some areas have been clearcut and planted to loblolly pine. Summer droughtiness increases seedling mortality, and the sandy surface layer reduces trafficability.

This soil provides fair habitat for wildlife, such as deer, rabbit, fox, and quail. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are sweet potatoes, peanuts, and soybeans. Droughtiness and the rapid leaching of plant nutrients are the main limitations. Soil blowing is the main hazard. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients. Windbreaks help control soil blowing.

Sandy soil material is the main limitation affecting building site and recreational development. Cutbanks cave in easily. Seepage is the main limitation affecting sanitary facilities. Lawns and shrubs are difficult to establish and maintain because of droughtiness. Irrigation, frequent fertilization, and additions of organic matter will increase plant growth.

The land capability classification is IVs, and the woodland ordination symbol is 6S.

AtA—Altavista fine sandy loam, 0 to 3 percent slopes. This soil is moderately well drained. It is on high stream terraces near the Cape Fear River. This soil is subject to rare flooding. The mapped areas are long and irregular in shape and range from 15 to 200 acres.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsurface layer, to a depth of 16 inches, is yellowish brown fine sandy loam. The subsoil extends to a depth of 50 inches. It is yellowish brown, mottled clay loam in the upper part; yellowish brown, mottled sandy clay loam in the middle part; and light gray, mottled sandy loam in the lower part. The substratum to a depth of 72 inches is grayish brown, mottled loamy sand.

Infiltration is medium, and surface runoff is slow. Permeability is moderate. The available water capacity is moderate or high. This soil is very strongly acid to medium acid except where lime has been added to the surface layer. The seasonal high water table is 1.5 to 2.5 feet below the surface.

Included with this soil in mapping are small areas of poorly drained soils in narrow depressions. The included soils make up about 20 percent of this map unit.

This Altavista soil is used mainly as woodland. In a few small areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, sweetgum, blackgum, southern red oak, white oak, yellow poplar, sycamore, American redcedar, red maple, hickory, willow oak, and water oak. The understory is American holly, gallberry, dwarf azalea, sourwood, dogwood, huckleberry, persimmon, black cherry, waxmyrtle, blueberry, and greenbrier. A few areas have been clearcut, bedded, and planted to loblolly pine. Logging when the soil is wet causes compaction, creates ruts, and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, rabbit, squirrel, bobcat, opossum, and birds.

In cultivated areas, the main crops are corn, soybeans, tobacco, and small grains. Wetness is a limitation affecting some crops. Open ditches and tile drains can be installed to improve drainage for crops, such as tobacco. Land grading improves surface runoff by eliminating depressions that pond water.

This soil generally is too wet for sanitary facilities, building site development, and recreational development without artificial drainage. In some areas land grading is needed to remove excess surface water. The caving of ditchbanks at a depth of more than 40 inches can be a problem. Flooding is a severe hazard on sites for dwellings.

The land capability classification is IIw, and the woodland ordination symbol is 9W.

AuB—Autryville fine sand, 1 to 4 percent slopes. This soil is well drained. It is on convex divides on the uplands near drainageways. The mapped areas are irregular in shape and range from 10 to 25 acres.

Typically, the surface layer is pale brown fine sand 9 inches thick. The subsurface layer, to a depth of 26 inches, is very pale brown fine sand. The subsoil to a depth of 80 inches is, in sequence downward, yellowish brown fine sandy loam, very pale brown fine sand, brownish yellow fine sandy loam, and brownish yellow, mottled loamy fine sand.

Infiltration is rapid, and surface runoff is slow. Permeability is moderately rapid in the upper part of the subsoil and moderate in the lower part. The available water capacity is low. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is 4 to 6 feet below the surface.

Included with this soil in mapping are small intermingled areas of Alpin, Baymeade, and Norfolk soils and small areas of Foreston and Muckalee soils. Alpin soils are sandy. Baymeade soils have a subsoil that is thinner than that of the Autryville soil. Norfolk soils have more clay in the subsoil than the Autryville soil. Foreston soils are in slight depressions and are moderately well drained. Muckalee soils are in narrow, wet drainageways and are poorly drained. The included soils make up about 15 percent of this map unit.

This Autryville soil is used mainly as woodland. In some areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are longleaf pine, loblolly pine, southern red oak, white oak, post oak, blackgum, and hickory. The understory is turkey oak, blackjack oak, sassafras, persimmon, flowering dogwood, blueberry, inkberry, huckleberry, pineland threeawn, American beautyberry, grape, poison ivy, Virginia creeper, and various panicums and lichens. Some areas have been clearcut and planted to loblolly pine. Summer droughtiness increases seedling mortality, and the sandy surface layer reduces trafficability.

This soil provides good habitat for wildlife, such as deer, rabbit, fox, and quail. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are tobacco, sweet potatoes, corn, peanuts, and soybeans (fig. 3). Droughtiness and the rapid leaching of plant nutrients are the main limitations. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients. Windbreaks help control soil blowing.

The caving of ditchbanks is the main limitation affecting building site development. Seasonal wetness and seepage are the main limitations affecting sanitary facilities. Seasonal wetness can be reduced by installing a drainage system that includes tile drains and open ditches. The caving of ditchbanks increases the need for maintenance of open ditches. Lawns and shrubs are difficult to establish and maintain because of droughtiness. Irrigation, frequent fertilization, and additions of organic matter will increase plant growth.

The land capability classification is IIs, and the woodland ordination symbol is 7S.

AyA—Aycock loam, 0 to 3 percent slopes. This soil is well drained. It is on slightly convex divides near the major drainageways. The mapped areas are long and irregular in shape and range from 15 to 25 acres.

Typically, the surface layer is grayish brown loam about 5 inches thick. The subsurface layer, to a depth of 10 inches, is pale brown loam. The subsoil extends to a depth of 72 inches. It is brownish yellow clay loam in the upper part; yellowish brown, mottled clay loam in the middle part; and mottled light gray, strong brown, and red clay in the lower part. The substratum to a depth of 80 inches is light gray, mottled loam that has thin layers of clay loam.

Infiltration is medium, and surface runoff is slow. Permeability is moderately slow or moderate. The available water capacity is high. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is 4 to 6 feet below the surface.

Included with this soil in mapping are small intermingled areas of Exum, Goldsboro, and Norfolk soils. All of these soils are in positions on the landscape similar to those of the Aycock soil. Exum and Goldsboro soils are moderately well drained. Norfolk soils have more sand and less silt in the subsoil than the Aycock soil. Also included are small areas of eroded Aycock soils on the slightly steeper slopes. The included soils make up about 15 percent of this map unit.

This Aycock soil is used mainly as cropland or as sites for residential development. In a few areas, it is used as woodland.

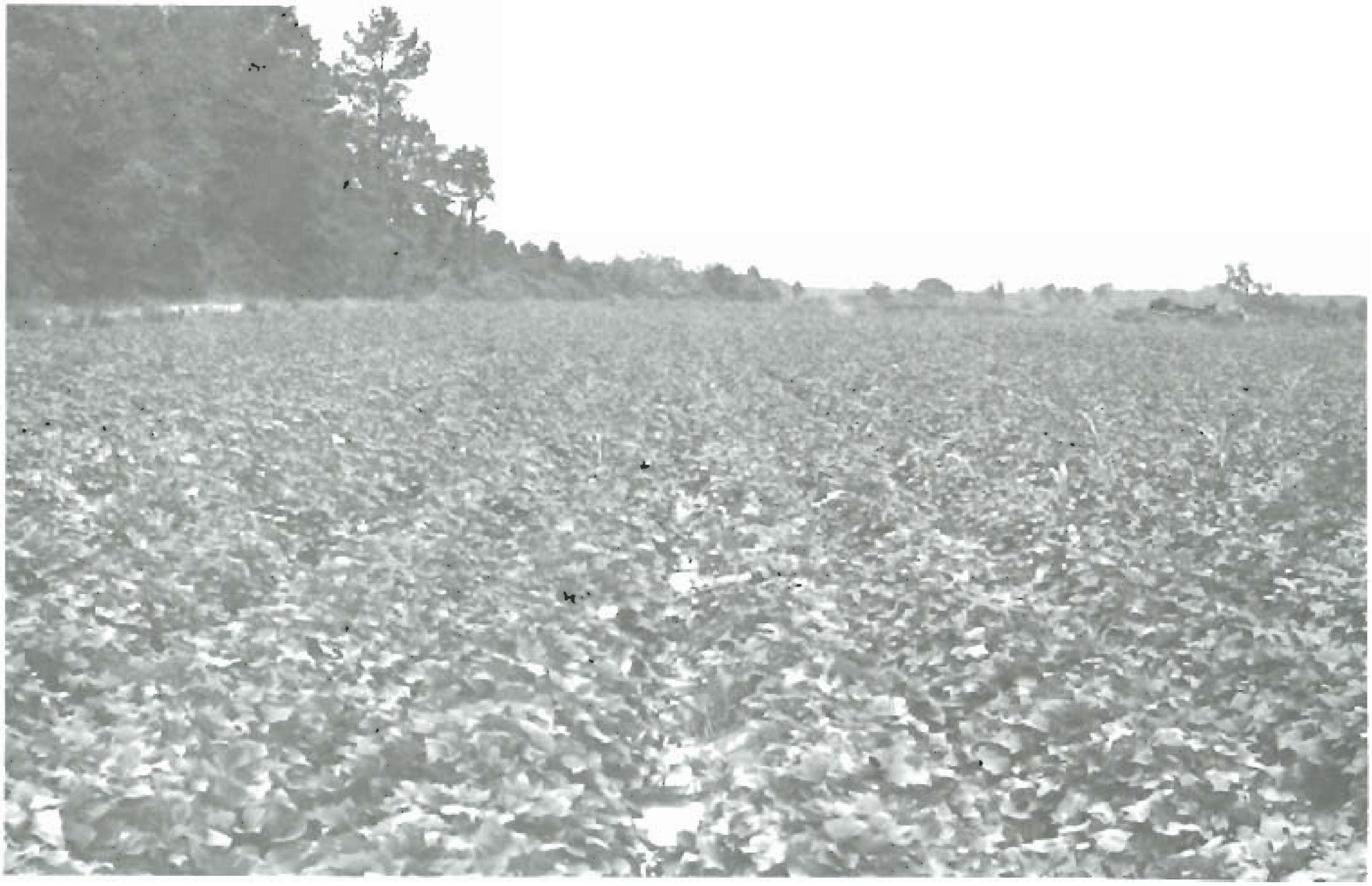


Figure 3.—Sweet potatoes in an area of Autryville fine sand, 1 to 4 percent slopes.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, southern red oak, white oak, hickory, and red maple. The understory is American holly, flowering dogwood, persimmon, black cherry, blackgum, waxmyrtle, blueberry, honeysuckle, dwarf azalea, lespedeza, grape, poison ivy, Virginia creeper, and greenbrier. Few limitations affect woodland management; however, logging when this soil is wet creates ruts and damages tree roots.

In the areas of woodland and openland, this soil provides good habitat for wildlife, such as deer, rabbit, fox, and quail.

In cultivated areas, the main crops are tobacco (fig. 4), corn, soybeans, and small grains. Erosion is the main hazard where this soil is used for row crops. Conservation tillage, cover crops, and crop residue management will help conserve moisture, reduce leaching of plant nutrients, and help control erosion.

Wetness and low soil strength are the main limitations affecting building site development. Wetness and restricted permeability are the main limitations affecting sanitary facilities. Installing a drainage system that includes tile drains and open ditches will lower the seasonal high water table on sites for most sanitary facilities. The main limitation affecting recreational development is restricted permeability, which causes water to pond for brief periods. Land grading can help to remove excess surface water.

The land capability classification is IIe, and the woodland ordination symbol is 8A.

AyB2—Aycock loam, 3 to 6 percent slopes, eroded. This soil is well drained. It is on convex divides near the major drainageways. The mapped areas are long and narrow and range from 15 to 25 acres.

Typically, the surface layer is mixed with the subsoil. It is yellowish brown loam about 4 inches thick. The subsoil extends to a depth of 60 inches. It is strong brown clay loam in the upper part, brownish yellow clay loam in the middle part, and mottled light gray, brownish yellow, and red clay loam in the lower part. The substratum to a depth of 80 inches is mottled brownish yellow, red, and light gray sandy clay loam.

Infiltration and surface runoff are medium. Permeability is moderately slow or moderate. The available water capacity is high. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is 4 to 6 feet below the surface.

Included with this soil in mapping are small areas of Craven, Exum, and Muckalee soils. Craven soils are slightly steeper than the Aycock soil and have more clay in the subsoil. Craven soils are moderately well drained. Exum soils also are moderately well drained. Muckalee soils are in narrow, wet drainageways and are poorly drained. Also included are small intermingled areas of Aycock soils that are on slopes of less than 3 percent. The included soils make up about 15 percent of this map unit.

This Aycock soil is used mainly as cropland or sites for residential development. In a few areas, it is used as woodland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, red oak, white oak, hickory, and red maple. The understory is American holly, flowering dogwood, persimmon, black cherry, blackgum, waxmyrtle, blueberry, honeysuckle, dwarf azalea, lespedeza, grape, poison ivy, Virginia creeper, and greenbrier. Few limitations affect woodland

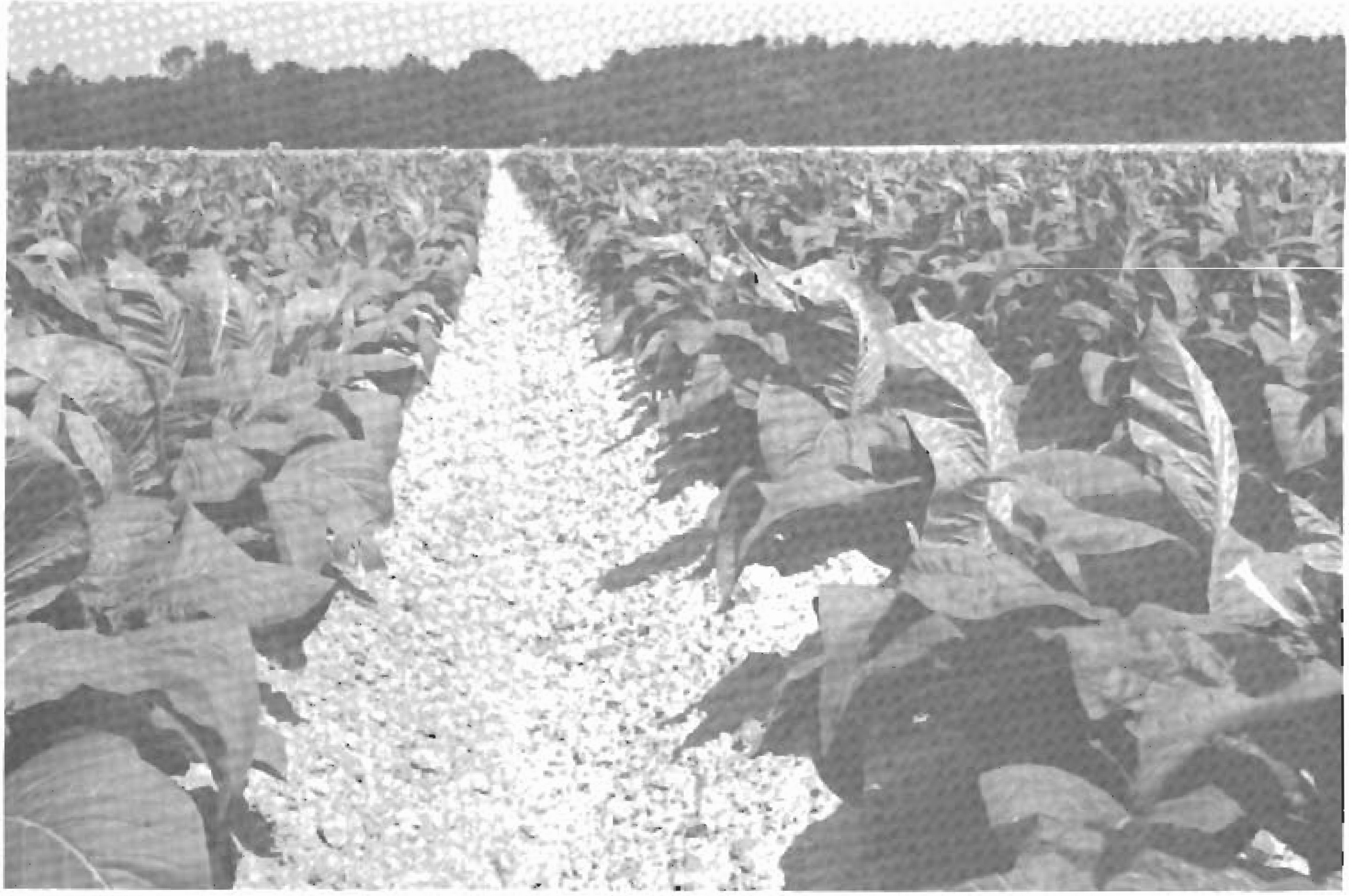


Figure 4.—Aycock loam, 0 to 3 percent slopes, is suited to tobacco.

management; however, logging when the soil is wet creates ruts and damages tree roots.

In the areas of woodland and openland, this soil provides good habitat for wildlife, such as deer, rabbit, fox, and quail.

In cultivated areas, the main crops are corn, soybeans, and small grains. Erosion is the main hazard where this soil is used for row crops. Conservation tillage, cover crops, contour cultivation, and crop residue management will help control erosion, conserve moisture, and reduce leaching of plant nutrients. Tilling only during periods of low moisture content helps to maintain good tilth.

Wetness and low soil strength are the main limitations affecting building site development. Wetness and restricted permeability are the main limitations affecting sanitary facilities. Installing a drainage system that includes tile drains and open ditches will lower the seasonal high water table. Diversions will reduce the hazard of erosion. The main limitations affecting recreational development are restricted permeability and slope. In areas that have been leveled, land grading that helps to remove excess surface water reduces the hazard of ponding.

The land capability classification is IIIe, and the woodland ordination symbol is 8A.

BaB—Baymeade fine sand, 1 to 4 percent slopes. This soil is well drained. It is on low ridges and convex divides on the uplands. The mapped areas generally are broad and long and range from 35 to 100 acres.

Typically, the surface layer is gray fine sand about 3 inches thick. The subsurface layer extends to a depth of 25 inches. It is light gray fine sand in the upper part, very pale brown fine sand in the middle part, and dark yellowish brown fine sand in the lower part. The subsoil extends to a depth of 58 inches. It is yellowish brown fine sandy loam in the upper part and brownish yellow fine sandy loam in the lower part. The substratum to a depth of 80 inches is very pale brown fine sand.

Infiltration is rapid, and surface runoff is slow. Permeability is moderately rapid. The available water capacity is low. This soil is very strongly acid to slightly acid except where lime has been added to the surface layer. The seasonal high water table is 4 to 5 feet below the surface.

Included with this soil in mapping are small areas of Autryville, Foreston, Kureb, Leon, and Onslow soils. Autryville soils are intermingled with areas of the Baymeade soil. They have a subsoil that is thicker than that of the Baymeade soil. Foreston and Onslow soils are moderately well drained, and Leon soils are poorly drained. All three of these soils are slightly lower on the landscape than the Baymeade soil. Kureb soils are sandy and are on small ridges that are slightly higher on the landscape than the Baymeade soil. The included soils make up about 20 percent of this map unit.

This Baymeade soil is used mainly as woodland or for recreational development. In some areas, it is used as cropland or for urban development.

Where this soil is used as woodland, the major canopy trees are longleaf pine, loblolly pine, southern red oak, white oak, post oak, blackgum, and hickory. The understory is turkey oak, blackjack oak, sassafras, persimmon, flowering dogwood, blueberry, inkberry, huckleberry, pineland threeawn, panicum grasses, American beautyberry, grape, poison ivy, Virginia creeper, and lichens. Some areas have been clearcut and planted to loblolly pine. Summer droughtiness increases seedling mortality, and the sandy surface layer reduces trafficability.

This soil provides poor or very poor habitat for wildlife, such as deer, rabbit, fox, and quail. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are tobacco, sweet potatoes, corn, peanuts, and soybeans. Droughtiness and leaching of plant nutrients are the main limitations. Soil blowing is the main hazard. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients. Windbreaks help control soil blowing.

The caving of ditchbanks is the main limitation affecting building site development. Seasonal wetness, a poor filtering capacity, and seepage are limitations affecting sanitary facilities. Seasonal wetness can be reduced by installing a drainage system that includes tile drains and open ditches. The caving of ditchbanks will increase the need for maintenance of open ditches. Lawns and shrubs are difficult to establish and maintain because of droughtiness. Irrigation, frequent fertilization, and additions of organic matter will increase plant growth.

The land capability classification is IIIs, and the woodland ordination symbol is 3S.

Bo—Bohicket silty clay loam, frequently flooded. This soil is very poorly drained. It is on tidal flats at elevations of 0 to 3 feet above sea level. The flats are dissected by creeks. The mapped areas are broad and range from 25 to 350 acres. The slopes are 0 to 1 percent.

Typically, the surface layer is black silty clay loam about 12 inches thick. The upper part of the underlying material is very dark grayish brown clay loam. The lower part to a depth of 65 inches is very dark grayish brown loam.

Infiltration is very slow, or no water penetrates the surface. Permeability is very slow. This soil is slightly acid to moderately alkaline. The water table fluctuates with the daily tides, which inundate the soil with brackish water.

Included with this soil in mapping are Carteret and Dorovan soils. Carteret soils are in long, narrow areas adjacent to waterways. These soils are sandy. Small areas of Dorovan soils are in the more inland areas. These soils formed in organic material. Also included are small areas of Bohicket soils, which have a silt loam or mucky silt loam surface layer. The included soils make up about 20 percent of this map unit.

This Bohicket soil generally is not used as woodland or cropland or for building site development or sanitary facilities. Recreational use is limited to hunting and fishing.

The native vegetation is suited to extreme wetness and salinity. The dominant plants include smooth cordgrass and black needlerush.

The edges of the tidal marsh areas provide good habitat for wildlife, such as raccoon, white-tailed deer, river otter, and marsh rabbit. Birds using these areas are the clapper rail, sara rail, gallinule, cattle egret, American egret, blue heron, black duck, lesser scaup, hooded merganser, and eastern brown pelican. Crab and shrimp and many kinds of fish, such as flounder, minnow, mullet, and menhaden, use these areas during high tides. Reptiles, such as the American alligator and young sea turtles, also use these areas.

The land capability classification is VIIIw. This soil has not been assigned a woodland ordination symbol.

Ca—Carteret fine sand, frequently flooded. This soil is very poorly drained. It is on tidal flats at elevations of 0 to 3 feet above sea level. The flats are dissected by narrow areas of water (fig. 5). The mapped areas are irregular in shape and range from 10 to 200 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is dark grayish brown fine sand about 3 inches thick. The underlying material to a depth of 60 inches is gray and greenish gray fine sand and sand.

Infiltration is very slow, or no water penetrates the surface. Permeability is rapid. This soil is medium acid to moderately alkaline. The water table fluctuates with the daily tides, which inundate the soil with brackish water.

Included with this soil in mapping are small areas of organic soils. These included soils make up about 20 percent of this map unit.

This Carteret soil generally is not used as woodland or cropland or for building site development or sanitary facilities. Recreational use is limited to hunting and fishing.

The native vegetation is adapted to extreme wetness and salinity. Important plants are smooth cordgrass, black needlerush, saltmeadow cordgrass, bulrush, sea oxeye, marshelder, saltgrass, eastern baccharis, and three-square rust.

The edges of the tidal marsh areas provide good habitat for wildlife, such as raccoon, deer, river otter, and marsh rabbit. Birds using these areas are the clapper rail, sara rail, gallinule, cattle egret, American egret, blue heron, black duck, lesser scaup, hooded merganser, and eastern brown pelican. Crab and shrimp and many kinds of fish, such as flounder, mullet, minnow, and menhaden, use these areas during high tides. Reptiles, such as the American alligator and young sea turtles, also use these areas.

The land capability classification is VIIIw. This soil has not been assigned a woodland ordination symbol.

Ch—Chewacla and Chastain soils, frequently flooded. These soils are on the flood plains along the Cape Fear River. They were not mapped separately because they react similarly to most kinds of use and management. They do not occur in a predictable pattern. Some areas contain only the Chewacla soil, and some areas, particularly on Roan Island, contain only the Chastain soil. Most areas, however, contain varying percentages of both of these soils. The Chewacla soil is somewhat poorly drained and is slightly higher on the landscape than the Chastain soil. The Chastain soil is poorly drained and generally is on long, narrow flats and in depressions on the flood plains away from the river. The mapped areas are long and broad and can be as much as 1,000 acres or more. The slopes range from 0 to 2 percent.

Typically, the Chewacla soil has a surface layer of dark grayish brown loam about 5 inches thick. The subsoil extends to a depth of 58 inches. It is dark yellowish brown, mottled loam in the upper part; gray, mottled fine sandy loam in the middle part; and light gray clay loam in the lower part. The substratum to a depth of 72 inches is grayish brown loamy sand that has thin layers of sandy loam and loam.

Permeability of the Chewacla soil is moderate. The available water capacity is high. Reaction ranges from very strongly acid to slightly acid. The seasonal high water table is commonly at a depth of 0.5 foot to 1.5

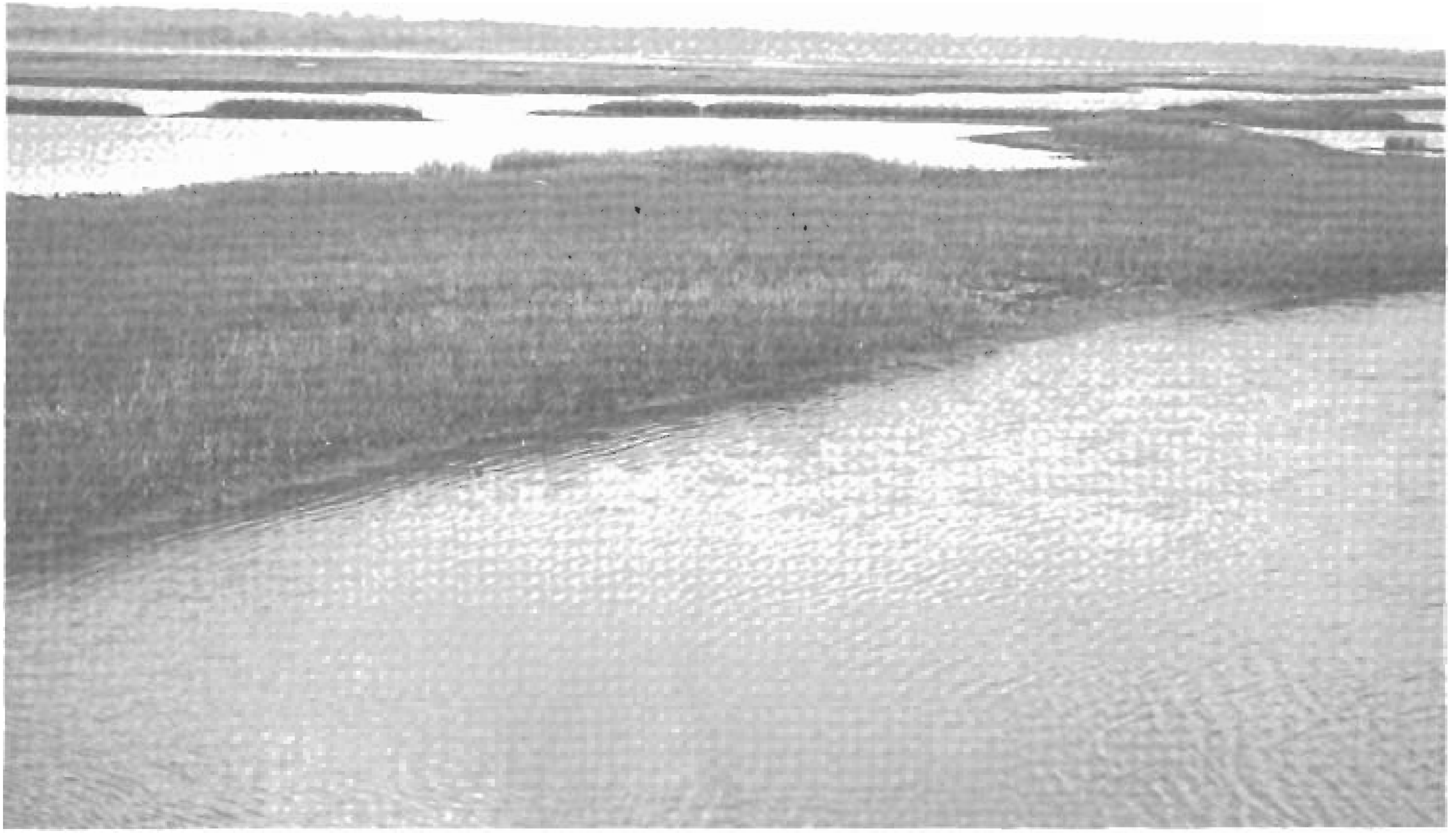


Figure 5.—Carteret fine sand, frequently flooded, is along waterways that are affected by the daily tides. The marsh vegetation on this soil is well adapted to wetness and salinity.

feet during fall and winter and early in the spring.

Typically, the Chastain soil has a surface layer of gray loam about 10 inches thick. The subsoil, to a depth of 40 inches, is gray, mottled clay loam. The upper part of the substratum is gray loamy sand. The lower part to a depth of 70 inches is grayish brown sand.

Permeability of the Chastain soil is slow. The available water capacity is moderate. Reaction is very strongly acid to slightly acid. The seasonal high water table is at or near the surface during fall and winter and early in the spring.

Included in mapping are scattered small areas of Dorovan soils. These soils formed in organic material. Also included are some small areas of well drained or moderately well drained soils on the highest parts of the landscape and small areas of soils that are more sandy than the Chewacla and Chastain soils. The included soils make up about 20 percent of this map unit.

The Chewacla and Chastain soils are used mainly as woodland. In a few small areas, they are used for hay and pasture.

Where these soils are used as woodland, the major canopy trees are sweetgum, red maple, yellow poplar, sycamore, eastern cottonwood, swamp chestnut oak, Carolina ash, wild olive, loblolly pine, willow oak, and water oak. On Roan Island, water tupelo and baldcypress are the dominant trees. Important understory plants are black willow, ironwood, river birch, brackenfern, brake fern, rattan, switchcane, honeysuckle, and greenbrier. Because of frequent flooding, these soils have limited accessibility for woodland management. Logging when the soils are wet causes compaction, creates deep ruts, and damages tree roots.

In the wooded areas, these soils provide a good habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, black bear, opossum, squirrel, and birds. The large wooded areas are used for hunting game animals.

Where these soils have been drained, they are used mainly for hay and pasture. A continuing high water table is the main limitation. Frequent flooding is a hazard.

These soils generally are not used for building site development, sanitary facilities, or recreational development. The seasonal high water table is the main limitation. Flooding is a hazard. A few hunting and fishing clubs are along stream channels on included soils that are higher on the landscape than the Chewacla or Chastain soils.

The land capability classification of the Chewacla soil is IVw, and the woodland ordination symbol is 10W. The land capability classification of the Chastain soil is VIw, and the woodland ordination symbol is 8W.

Ct—Croatan muck. This soil is very poorly drained. It is on interstream divides between widely spaced natural drainageways. It is mostly in the broad, flat interstream areas of Angola Bay and Holly Shelter. The smaller areas are in oval depressions. This soil is subject to rare flooding for brief periods. The mapped areas range from 100 to 3,000 acres. The slopes range from 0 to 2 percent.

Typically, the upper 35 inches is black muck. Below this is dark brown fine sandy loam about 10 inches thick. The upper part of the underlying material is dark grayish brown sandy clay loam. The lower part to a depth of 80 inches is dark grayish brown fine sandy loam.

Infiltration is medium or slow, depending on the depth to the water table. Surface runoff is slow to ponded. Permeability is slow to moderate. The available water capacity is very high. Subsidence can be as much as 5 to 10 inches if the soil is drained (fig. 6). The organic material is extremely acid except where lime has been added. The underlying mineral soil is extremely acid to slightly acid. The seasonal high water table is at or near the surface for about 6 months.

Included with this soil in mapping are scattered small areas of Murville, Pantego, and Torhunta soils. These soils formed in mineral deposits. Also included are soils that are similar to the Croatan soil but have a muck layer about 51 to 65 inches thick. These soils are near the center of large areas of this map unit in the vicinity of Angola Bay. The included soils make up about 25 percent of this map unit.

This Croatan soil is used mainly as woodland. In a few areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are scattered pond pine, water tupelo, yellow poplar, Atlantic white cedar, and baldcypress. The understory is redbay, sweetbay, loblolly bay, fetterbush lyonia, gallberry, southern bayberry, blueberry, sweet pepperbush, switchcane, brackenfern, cinnamon fern, titi, greenbrier, and sphagnum moss. Large areas have been clearcut, ditched, bedded, fertilized, and planted to loblolly pine. Seedling mortality and low soil strength are the main management concerns. Logging when the soil is wet causes deep ruts in the muck surface layer and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, black bear, rabbit, bobcat, opossum, and birds. The wooded areas are used for hunting game animals.

Where this soil is drained and cultivated, corn and soybeans are the main crops. Seasonal wetness, low soil strength, and nutrient deficiencies are the main limitations. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Cover crops and crop residue management help control weeds and reduce leaching of plant nutrients. Large amounts of lime may be needed for some crops.

This soil generally is not used for building site development, sanitary facilities, or recreational development. Seasonal wetness and low soil strength are the main limitations. Wetness can be reduced by installing a drainage system, which includes land grading that improves surface drainage, tile drains, and open ditches. Even if the soil is drained, wetness and low soil strength are continuing problems.

The land capability classification is VIIw in undrained areas and is IVw in drained areas. The woodland ordination symbol is 4W.

Do—Dorovan muck, frequently flooded. This soil is very poorly drained. It is on the low flood plains along freshwater and brackish streams. This soil is frequently flooded throughout the year. The mapped areas are long and irregular in shape and range from 20 to 400 acres. The slopes are less than 1 percent.

Typically, the upper 60 inches is black and very dark brown muck about 60 inches thick. A live root mat is in the upper part of the surface layer. The underlying mineral soil to a depth of 75 inches is very dark gray loamy sand.

Infiltration is very slow, or no water penetrates the surface. Permeability is moderate. The organic material is extremely acid, and the mineral material is very strongly acid or strongly acid. The water table is near or above the surface.

Included with this soil in mapping are Croatan and Muckalee soils. Croatan soils have organic layers that

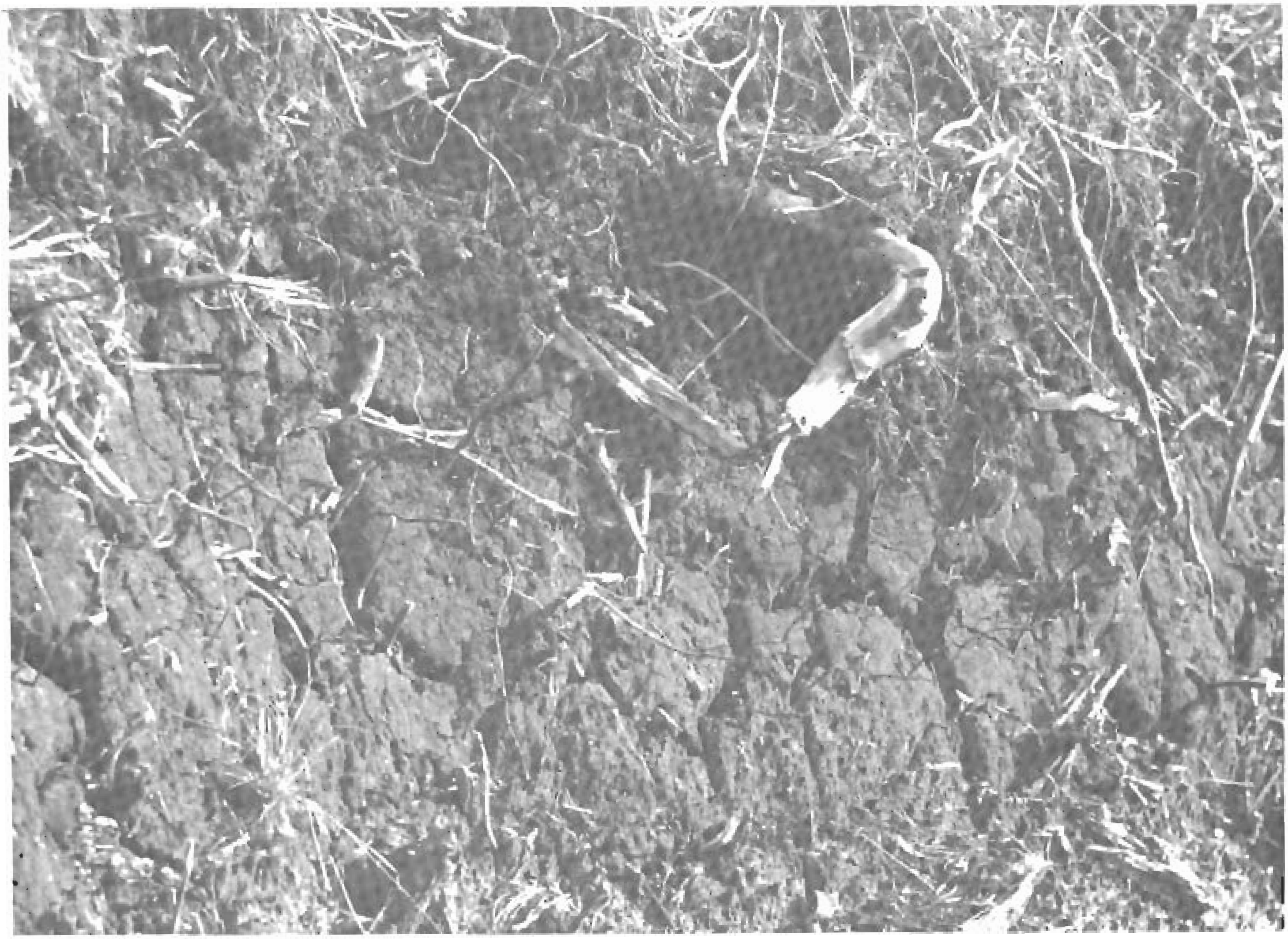


Figure 6.—If Croatan muck is drained, subsidence occurs and shrinkage cracks appear after the soil dries.

are thinner than those of the Dorovan soil. Muckalee soils are in long, narrow areas near streambanks. These soils formed in mineral sediment. The included soils make up about 10 percent of this map unit.

This Dorovan soil is used mostly as woodland. The major canopy trees are water tupelo, loblolly pine, green ash, sweetgum, water oak, Carolina ash, willow oak, red maple, sweetbay, loblolly bay, and baldcypress. The understory plants are greenbrier, rattan, sphagnum moss, royal fern, gallberry, longleaf uniola, panicum, and honeysuckle. Low soil strength is a limitation. The use of logging equipment creates deep ruts and damages tree roots.

This soil provides good habitat for wetland wildlife. The large wooded areas are used for hunting game animals.

This soil is not used as cropland because of flooding and the high water table. In areas of brackish water, it is not used as cropland because of salinity.

This soil is not used for building site development, sanitary facilities, or recreational development. The high water table is the main limitation. Flooding is a hazard.

The land capability classification is VIIw, and the woodland ordination symbol is 5W.

EmA—Exum loam, 0 to 2 percent slopes. This soil is moderately well drained. It is on slightly convex uplands near shallow drainageways and in interstream areas. The mapped areas are irregular in shape and range from 10 to 40 acres.

Typically, the surface layer is grayish brown loam about 6 inches thick. The subsurface layer, to a depth of 9 inches, is pale brown loam. To a depth of 80 inches, the subsoil is, in sequence downward, light yellowish brown loam, brownish yellow, mottled clay loam; light gray, strong brown, and light yellowish brown, mottled clay loam; and light gray, mottled clay loam.

Infiltration is medium, and surface runoff is slow. Permeability is moderately slow. The available water capacity is high. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is 2 to 3 feet below the surface.

Included with this soil in mapping are small areas of Aycock, Foreston, Goldsboro, and Grantham soils. Aycock soils are well drained and are near drainageways. Small intermingled areas of Foreston and Goldsboro soils are in positions on the landscape similar to those of the Exum soil. These soils have more sand and less silt in the subsoil than the Exum soil. Grantham soils are in shallow depressions and are poorly drained. The included soils make up about 15 percent of this map unit.

This Exum soil is used mainly as cropland. In some areas, it is used as woodland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, sweetgum, blackgum, southern red oak, white oak, yellow poplar, sycamore, American redcedar, red maple, hickory, willow oak, and water oak. The understory is American holly, gallberry, honeysuckle, dwarf azalea, sourwood, flowering dogwood, huckleberry, grape, persimmon, black cherry, waxmyrtle, blueberry, poison ivy, and greenbrier. Some large areas have been clearcut and planted to loblolly pine. Logging when the soil is wet causes compaction, creates ruts, and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, rabbit, squirrel, bobcat, opossum, and birds. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are tobacco, corn (fig. 7), soybeans, and small grains. Seasonal wetness limits aeration in the root zone for crops, such as tobacco. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients.

Seasonal wetness and restricted permeability are the main limitations affecting building site development, sanitary facilities, and recreational development. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches.

The land capability classification is IIw, and the woodland ordination symbol is 8W.

EuA—Exum-Urban land complex, 0 to 2 percent slopes. This map unit consists of intermingled areas of Exum soil and Urban land. The Exum soil is moderately well drained and is on the uplands. The individual areas of the Exum soil and Urban land are too small or too mixed to be mapped separately at the scale used.

The Exum soil makes up about 50 percent of this map unit, and Urban land makes up about 30 percent. Included soils make up about 20 percent.

Typically, this Exum soil has a surface layer of grayish brown loam about 6 inches thick. The subsurface layer, to a depth of 9 inches, is pale brown loam. The subsoil to a depth of 80 inches is light yellowish brown loam in the upper part; brownish yellow, mottled clay loam in the middle part; and light gray, mottled clay loam in the lower part.

The Urban land is covered by buildings, streets, and parking lots.

Included in mapping are some broad, nearly level areas of Grantham soils and some areas of Muckalee soils in narrow drainageways. Grantham and Muckalee soils are poorly drained.

Permeability of this Exum soil is moderately slow. The available water capacity is high. Surface runoff is slow. The soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is 2 to 3 feet below the surface.

Wetness and low soil strength are the main limitations affecting building site development. If the proper kinds and amounts of fertilizer are applied, few limitations affect lawns and landscaping. The loamy surface layer is easy to till. Wetness and restricted permeability are limitations if this soil is used for playgrounds or picnic areas. Land grading that helps to remove excess surface water and tile drains will minimize these limitations. Onsite investigations are needed to determine the best designs for buildings and recreational areas.

This map unit has not been assigned a land capability classification or a woodland ordination symbol.

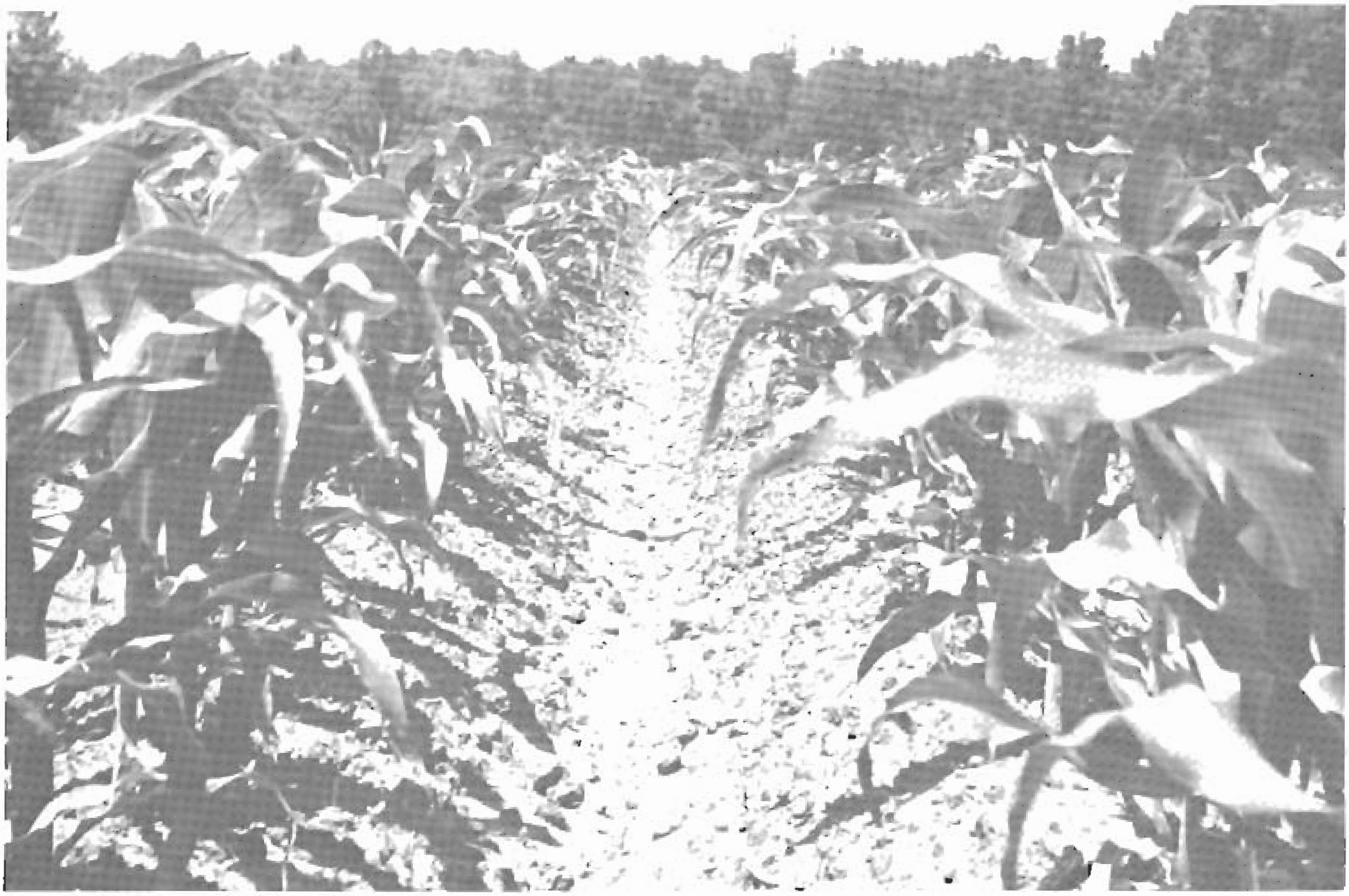


Figure 7.—Corn in an area of Exum loam, 0 to 2 percent slopes.

Fo—Foreston loamy fine sand. This soil is moderately well drained. It is on slightly convex interstream divides near shallow drainageways. The mapped areas are irregular in shape and range from 25 to 150 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is dark grayish brown loamy fine sand about 8 inches thick. The subsurface layer, to a depth of 13 inches, is pale brown loamy fine sand. The subsoil extends to a depth of 66 inches. The upper part is light yellowish brown fine sandy loam. The lower part is light gray, mottled fine sandy loam that has pockets of loamy fine sand and strata of loamy sand. The substratum to a depth of 80 inches is light gray sandy clay loam that has strata of sand and sandy loam.

Infiltration is medium, and surface runoff is slow. Permeability is moderately rapid. The available water capacity is low or moderate. This soil is very strongly acid to medium acid except where lime has been added to the surface layer. The seasonal high water table is 2.5 to 3.5 feet below the surface.

Included with this soil in mapping are small areas of Autryville, Exum, Goldsboro, Onslow, and Woodington soils. Autryville soils are well drained. They are in higher areas than the Foreston soil and are near drainageways. Exum, Goldsboro, and Onslow soils are intermingled throughout some areas of this map unit. These soils are in positions on the landscape similar to those of the Foreston soil. Exum soils have more silt in the subsoil than the Foreston soil, and Goldsboro and Onslow soils have more clay in the subsoil. Woodington soils are in shallow depressions and are poorly drained. The included soils make up about 20 percent of this map unit.

This Foreston soil is used mainly as woodland. In some areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, sweetgum, blackgum, southern red oak, white oak, yellow poplar, sycamore, American redcedar, red maple, hickory, willow oak, and water oak. The understory is American holly, gallberry, honeysuckle, dwarf azalea, sourwood, flowering dogwood, huckleberry, grape, persimmon, black cherry, waxmyrtle, blueberry, poison ivy, and greenbrier. Some large areas have been clearcut and planted to loblolly pine. Logging when the soil is wet causes compaction, creates ruts, and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, rabbit, squirrel, bobcat, opossum, and birds.

In cultivated areas, the main crops are tobacco, corn, soybeans, and small grains. Seasonal wetness limits aeration in the root zone for crops, such as tobacco. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. The caving of ditchbanks increases the need for maintenance of open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients.

The caving of cutbanks and seasonal wetness are the main limitations affecting deep excavations on building sites. The main limitation affecting sanitary facilities is seasonal wetness, which can be reduced by installing a subsurface drainage system. Adequate spacing between leach lines in septic tank absorption fields and between drain tiles or ditches is necessary to decrease the hazard of ground water contamination. Onsite investigations are needed to determine the best design for sanitary facilities. No major limitations affect recreational development.

The land capability classification is IIw, and the woodland ordination symbol is 9W.

GoA—Goldsboro fine sandy loam, 0 to 2 percent slopes. This soil is moderately well drained. It is on slightly convex interstream divides near shallow drainageways. The mapped areas are long and irregular in shape and range from 15 to 200 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 10 inches thick. The subsurface layer, to a depth of 14 inches, is light yellowish brown fine sandy loam. The subsoil extends to a depth of 63 inches. It is brownish yellow sandy clay loam in the upper part; brownish yellow, mottled sandy clay loam in the middle part; and light gray, mottled sandy clay loam in the lower part. The substratum to a depth of 80 inches is light gray, mottled sandy clay loam that has thin strata of sandy loam and sandy clay.

Infiltration is medium, and surface runoff is slow. Permeability is moderate. The available water capacity is moderate or high. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is 2 to 3 feet below the surface.

Included with this soil in mapping are small areas of Exum, Foreston, Onslow, Norfolk, and Rains soils. Exum, Foreston, and Onslow soils are intermingled throughout some areas of this map unit. They are in positions on the landscape similar to those of the Goldsboro soil. Exum soils have more silt in the subsoil than the Goldsboro soil. Onslow soils have pockets of dark reddish brown, weakly cemented material in the subsurface layer. Foreston soils have more sand and less clay in the subsoil than the Goldsboro soil. Small areas of Norfolk soils are near large drainageways. These soils are well drained. Rains soils are poorly drained and are in shallow, narrow depressions. The included soils make up about 15 percent of this map unit.

This Goldsboro soil is used mainly as cropland. In some areas, it is used as woodland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, sweetgum, blackgum, southern red oak, white oak, yellow poplar, sycamore, American redcedar, red maple, hickory, willow oak, and water oak. The understory is American holly, gallberry, honeysuckle, dwarf azalea, sourwood, flowering dogwood, huckleberry, grape, persimmon, black cherry, waxmyrtle, blueberry, poison ivy, and greenbrier. Some large areas have been clearcut and planted to loblolly pine. Logging when the soil is wet causes compaction, creates ruts, and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, rabbit, squirrel, bobcat, opossum, and birds. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are tobacco, corn, soybeans, and small grains. Seasonal wetness limits aeration in the root zone for crops, such as tobacco. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients.

Seasonal wetness is the main limitation affecting building site development, sanitary facilities, and recreational development. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches.

The land capability classification is IIw, and the woodland ordination symbol is 9W.

Gr—Grantham loam. This soil is poorly drained. It is on broad interstream divides and in depressions. In low areas, this soil is subject to ponding for brief periods. The mapped areas are irregular in shape and range from 20 to 200 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is dark gray loam about 8 inches thick. The subsurface layer, to a depth of 11 inches, is light gray loam. The subsoil to a depth of 75 inches is light gray, mottled clay loam.

Infiltration is medium or slow, depending on the depth to the water table. Surface runoff is slow. Permeability is moderately slow. The available water capacity is high. This soil is extremely acid to strongly acid except where lime has been added to the surface layer. The seasonal high water table is within a depth of 1 foot.

Included with this soil in mapping are small areas of Exum and Liddell soils. Exum soils are moderately well drained and are higher on the landscape than the Grantham soil. They are mostly along the edge of the mapped areas. Liddell soils have more silt than the Grantham soil. They are in positions on the landscape similar to those of the Grantham soil. Also included are small areas of a soil that is similar to the Grantham soil but has a higher clay content. This soil is in shallow depressions in some areas. The included soils make up about 15 percent of this map unit.

This Grantham soil is used manly as woodland. In a few large areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, red maple, willow oak, sweetgum, swamp chestnut oak, and water oak. The understory is redbay, sweetbay, fetterbush lyonia, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, poison ivy, grape, cinnamon fern, brackenfern, and greenbrier. Some large areas have been clearcut, ditched, bedded, fertilized, and planted to loblolly pine. Logging when the soil is wet causes compaction, creates deep ruts, and damages tree roots. The ruts hold water for long periods.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, opossum, black bear, and birds. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are corn and soybeans. Seasonal wetness is the main limitation. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture during the summer and reduce leaching of plant nutrients.

Seasonal wetness, low soil strength, and moderately slow permeability are the main limitations affecting building site development, sanitary facilities, and recreational development. Wetness can be reduced by land grading that helps to remove surface water and by tile drains and open ditches. Even if this soil is drained, the moderately slow permeability is a continuing problem that will affect some sanitary facilities.

The land capability classification is VIw in undrained areas and is IIIw in drained areas. The woodland ordination symbol is 9W.

Gt—Grifton loamy fine sand. This soil is poorly drained. It is in slight depressions and on broad interstream divides. This soil is subject to ponding for brief periods. The mapped areas are long and irregular in shape and range from 25 to 150 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is grayish brown loamy fine sand about 9 inches thick. The subsurface layer, to a depth of 12 inches, is light brownish gray, mottled fine sandy loam. The subsoil extends to a depth of 72 inches. The upper part is light gray, mottled sandy clay loam, and the lower part is light gray, mottled sandy loam that has layers of sandy clay loam and sandy clay. The substratum to a depth of 80 inches is white, soft marl that has a few hard fragments and pockets of loamy material.

Infiltration is medium or slow, depending on the depth to the water table. Surface runoff is slow. Permeability is moderate. The available water capacity is moderate or high. The surface layer, the subsurface layer, and the upper part of the subsoil are very strongly acid to slightly acid except where lime has been added to the surface layer. The lower part of the subsoil and the substratum are medium acid to moderately alkaline. The seasonal high water table is at or near the surface.

Included with this soil in mapping are small areas of Muckalee, Meggett, and Rains soils. Muckalee soils are in shallow drainageways and are subject to flooding. Meggett soils have more clay in the subsoil than the Grifton soil and are in narrow depressions. Rains soils are more acid than the Grifton soil, particularly in the lower part of the subsoil and in the substratum. These soils are in areas near the outer edges of this map unit. The included soils make up 20 percent of this map unit.

This Grifton soil is used mainly as woodland. In some areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, red maple, willow oak, sweetgum, swamp chestnut oak, and water oak. The understory is redbay, sweetbay, fetterbush lyonia, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, poison ivy, grape, cinnamon fern, brackenfern, and greenbrier. Some large areas have been clearcut, ditched, bedded, fertilized, and planted to loblolly pine. Logging when this soil is wet causes compaction, creates deep ruts, and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, opossum, black bear, and birds. The wooded areas are used for hunting game animals.

Where this soil is drained and cultivated, corn and soybeans are the main crops. Seasonal wetness is the main limitation. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture during the summer and reduce leaching of plant nutrients.

Seasonal wetness is the main limitation affecting building site development, sanitary facilities, and recreational development. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Even if this soil is drained, the high water table is a probable continuing problem that will affect some sanitary facilities.

The land capability classification is VIw in undrained areas and is IIIw in drained areas. The woodland ordination symbol is 9W.

InA—Invershiel-Pender complex, 0 to 2 percent slopes. The soils in this map unit are on the uplands near large drainageways. The Invershiel soil is moderately well drained, and the Pender soil is moderately well drained or somewhat poorly drained. The individual areas of the soils in this map unit are too mixed or too small to be mapped separately at the scale used. The mapped areas are irregular in shape and range from 10 to 300 acres.

The Invershiel soil makes up about 70 percent of this map unit, and the Pender soil makes up about 20 percent. Included soils make up about 10 percent.

Typically, the Invershiel soil has a surface layer of dark yellowish brown loamy sand about 4 inches thick. The subsurface layer, to a depth of 8 inches, is light gray loamy sand. The subsoil extends to a depth of 30 inches. It is yellowish brown clay loam in the upper part, yellowish brown, mottled clay loam in the middle part, and mottled gray, yellowish brown, and strong brown clay in the lower part. The substratum to a depth of 65 inches is light gray, mottled, soft marl.

Infiltration in the Invershiel soil is rapid or medium, and surface runoff is slow. Permeability is slow. The available water capacity is low. The shrink-swell potential is high in the subsoil. This soil is very strongly acid to slightly acid in the surface and subsurface layers except where lime has been added to the surface layer. The subsoil is strongly acid to mildly alkaline. The seasonal high water table is 1.0 to 2.5 feet below the surface.

Typically, the Pender soil has a surface layer of brown fine sandy loam about 6 inches thick. The subsurface layer, to a depth of 13 inches, is light yellowish brown loamy fine sand. The subsoil extends to a depth of 54 inches. The upper part is brownish yellow sandy clay loam; the next part is light yellowish brown, mottled sandy clay loam; the lower part is light gray, mottled sandy clay loam that has thin layers of sandy loam. The substratum extends to a depth of 75 inches. The upper part is light gray, mottled clay loam that has thin layers of sandy clay loam. The lower part is white, soft marl that has a few fragments of hard marl.

Infiltration in the Pender soil is medium, and surface runoff is slow. Permeability is moderate. The available water capacity also is moderate. The shrink-swell potential is low. This soil is very strongly acid to slightly acid in the surface and subsurface layers except where lime has been added to the surface layer. The subsoil is medium acid to moderately alkaline. The seasonal high water table is 1.5 to 2.5 feet below the surface.

Included in mapping are small intermingled areas of Grifton and Meggett soils. These soils are poorly drained and are in small depressions.

About one-half of the acreage of the Invershiel and Pender soils is used as woodland. The remaining acreage is used as cropland.

Where these soils are used as woodland, the major canopy trees are loblolly pine, longleaf pine, yellow poplar, sweetgum, American sycamore, red maple, hickory, water oak, willow oak, red oak, blackgum, and white oak. The understory is holly, dogwood, persimmon, black cherry, poison ivy, grape, waxmyrtle, huckleberry, gallberry, and greenbrier. Some areas have been clearcut, bedded, and planted to loblolly pine. Logging when these soils are wet causes compaction, creates ruts, and damages tree roots.

The openland and wooded areas of the Pender soil and wooded areas of the Invershiel soil provide good habitat for wildlife, such as deer, rabbit, fox, and quail. Openland areas of the Invershiel soil provide fair habitat. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are corn and soybeans. Seasonal wetness and slow permeability are the main limitations in the Invershiel soil. Seasonal wetness also is the main limitation in the Pender soil. Wetness can be reduced by land grading that helps to remove excess surface water and by open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture during the summer.

Wetness, the high shrink-swell potential of the subsoil, and low soil strength are the main limitations that affect building site development on the Invershiel soil. Wetness, slow permeability, and the high clay content of the subsoil are the main limitations affecting sanitary facilities. Wetness and slow permeability are limitations affecting recreational development. Wetness is the main limitation that affects building site development, sanitary facilities, and recreational development on the Pender soil. Reducing seasonal wetness in the Invershiel soil is difficult because of the slowly permeable, clayey subsoil. Tile drains and open ditches can reduce wetness in both soils, but these drainage measures are more effective in the Pender soil.

The land capability classification of these soils is IIIw. The woodland ordination symbol is 10W for the Invershiel soil and 9W for the Pender soil.

Jo—Johns fine sandy loam. This soil is somewhat poorly drained or moderately well drained. It is on stream terraces. This soil is subject to rare flooding. The mapped areas are irregular in shape and range from 5 to 125 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is dark grayish brown fine sandy loam about 9 inches thick. The subsurface layer extends to a depth of 17 inches. It is pale brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The subsoil extends to a depth of 37 inches. It is yellowish brown sandy clay loam in the upper part; yellowish brown, mottled sandy clay loam in the middle part; and light brownish gray, mottled sandy loam in the lower part. The substratum to a depth of 60 inches is grayish brown, mottled sand that has layers of loamy sand.

Infiltration is medium, and surface runoff is slow. Permeability is moderate. The available water capacity is low or moderate. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is 1.5 to 3.0 feet below the surface.

Included with this soil in mapping are small intermingled areas of Pactolus and Lumbee soils. Pactolus soils are sandy throughout and are slightly higher on the landscape than the Johns soil. Lumbee soils are poorly drained and are in depressions. The included soils make up about 20 percent of this map unit.

This Johns soil is used mainly as woodland. In a few small areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, sweetgum, blackgum, southern red oak, white oak, yellow poplar, sycamore, American redcedar, red maple, hickory, willow oak, and water oak. The understory is American holly, gallberry, honeysuckle, dwarf azalea, sourwood, flowering dogwood, huckleberry, grape, persimmon, black cherry, waxmyrtle, blueberry, poison ivy, and greenbrier. Some large areas have been clearcut and planted to loblolly pine. Logging when this soil is wet causes compaction, creates ruts, and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, rabbit, squirrel, bobcat, opossum, and birds. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are tobacco, corn, soybeans, and small grains. Seasonal wetness limits aeration in the root zone for crops, such as tobacco. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. The caving of ditchbanks increases the need for maintenance of open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients.

Seasonal wetness is the main limitation affecting building site development, sanitary facilities, and recreational development. Rare flooding is a hazard. Seepage is a limitation affecting some sanitary facilities. Cutbanks of shallow excavations are subject to caving. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches.

The land capability classification is IIw, and the woodland ordination symbol is 9W.

KaA—Kalmia loamy fine sand, 0 to 2 percent slopes. This soil is well drained. It is on slightly convex stream terraces adjacent to low flood plains. Most areas of this soil are along the Black and Northeast Cape Fear Rivers and the terraces along Rocky Fish Creek. The mapped areas are irregular in shape and range from 5 to 25 acres.

Typically, the surface layer is dark grayish brown loamy fine sand about 8 inches thick. The subsurface layer, to a depth of 12 inches, is pale brown fine sandy loam. The subsoil extends to a depth of 39 inches. It is yellowish brown sandy clay loam in the upper part and light yellowish brown fine sandy loam in the lower part. The upper part of the substratum is light yellowish brown loamy sand. The lower part to a depth of 80 inches is white sand.

Infiltration is rapid or medium, and surface runoff is slow. Permeability is moderate. The available water capacity also is moderate. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is about 4 to 6 feet below the surface.

Included with this soil in mapping are small intermingled areas of Kenansville and Johns soils. Kenansville soils are on the slightly higher ridges and have a thick, sandy surface layer and subsurface layer. Johns soils are somewhat poorly drained or moderately well drained and are in depressions. The included soils make up about 20 percent of this map unit.

This Kalmia soil is used mainly as woodland. In a few small areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, red oak, white oak, hickory, and red maple. The understory is American holly, flowering dogwood, persimmon, black cherry, blackgum, waxmyrtle, blueberry, honeysuckle, dwarf azalea, sericea, grape, poison ivy, Virginia creeper, and greenbrier. Few limitations affect woodland management; however, logging when the soil is wet causes ruts and damages tree roots.

This soil provides good habitat for wildlife, such as deer, rabbit, fox, and quail.

In cultivated areas, the main crops are tobacco, corn, soybeans, and small grains. Conservation tillage, cover crops, and crop residue management will reduce the hazard of erosion, conserve moisture, and reduce leaching of plant nutrients.

The seasonal high water table and caving of cutbanks are the main limitations affecting building site development. The seasonal high water table and seepage are the main limitations affecting sanitary facilities. If dwellings with basements are constructed, basement floors should not be below a depth of about 4 feet. Drain tiles should be installed along the outside perimeter of the basement at a depth of about 4 feet. If deep trenches are excavated, temporary retaining walls should be installed. The depth of trenches in septic tank absorption fields should not extend to the seasonal high water table or the sandy substratum. This soil is well suited to recreational development.

The land capability classification is I, and the woodland ordination symbol is 9A.

KeB—Kenansville fine sand, 0 to 4 percent slopes. This soil is well drained. It is on low ridges on terraces. The mapped areas are irregular in shape and range from 10 to 25 acres.

Typically, the surface layer is grayish brown fine sand about 9 inches thick. The subsurface layer, to a depth of 24 inches, is pale brown fine sand. The subsoil extends to a depth of 42 inches. It is yellowish brown fine sandy loam in the upper part and brownish yellow loamy fine sand in the lower part. The substratum extends to a depth of 80 inches. It is very pale brown sand in the upper part and white sand in the lower part.

Infiltration is rapid, and surface runoff is slow. Permeability is moderately rapid. The available water capacity is low. This soil is very strongly acid to medium acid except where lime has been added to the surface layer. The seasonal high water table is 4 to 6 feet below the surface.

Included with this soil in mapping are intermingled areas of Kalmia and Alpin soils and small areas of Pactolus, Johns, and Muckalee soils. Kalmia and Alpin soils are in landscape positions similar to those of the Kenansville soil. Kalmia soils have sandy surface and subsurface layers that are thinner than those of the Kenansville soil. Alpin soils are sandy throughout. Pactolus and Johns soils are moderately well drained or somewhat poorly drained and are in slight depressions. Muckalee soils are poorly drained and are in narrow drainageways. Also included are short slopes of more than 4 percent in narrow bands where this map unit joins the Northeast Cape Fear River. The included soils make up about 15 percent of this map unit.

This Kenansville soil is used mainly as woodland. In some areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are longleaf pine, loblolly pine, southern red oak, white oak, post oak, blackgum, and hickory. The understory is turkey oak, blackjack oak, sassafras, persimmon, flowering dogwood, blueberry, inkberry, huckleberry, pineland threeawn, panicum grasses, American beautyberry, grape, poison ivy, Virginia creeper, and lichens. Some areas have been clearcut and planted to loblolly pine. Summer droughtiness increases seedling mortality, and the sandy surface layer reduces trafficability. These limitations are the main management concerns.

This soil provides good habitat for wildlife, such as deer, rabbit, fox, and quail. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are tobacco, sweet potatoes, corn, peanuts, and soybeans. Droughtiness and leaching of plant nutrients are the main limitations. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients. Windbreaks help control soil blowing.

The seasonal high water table and caving of cutbanks are the main limitations affecting building site development. The seasonal high water table and seepage are the main limitations affecting sanitary facilities. If dwellings with basements are constructed, basement floors should not be below a depth of about 4 feet. Drain tiles should be installed along the outside perimeter of the basement at a depth of about 4 feet. If deep trenches are excavated, temporary retaining walls should be installed. The depth of trenches in septic tank absorption fields should not extend to the seasonal high water table or the sandy substratum. This soil is well suited to recreational development.

The land capability classification is IIs, and the woodland ordination symbol is 8S.

KuB—Kureb fine sand, 2 to 6 percent slopes. This soil is excessively drained. It is on the uplands. The mapped areas generally are long and irregular in shape and range from 30 to 100 acres.

Typically, the surface layer is light gray fine sand about 5 inches thick. The subsurface layer, to a depth of 24 inches, also is light gray fine sand. The underlying material to a depth of 80 inches is brownish yellow, light yellowish brown, and pale brown fine sand that has dark reddish brown concretions in bands and streaks.

Infiltration is rapid, and surface runoff is slow. Permeability is rapid. The available water capacity is very low. This soil is very strongly acid to neutral.

Included with this soil in mapping are small areas of Alpin, Mandarin, Leon, and Murville soils. Alpin and Mandarin soils are lower on the landscape than the Kureb soil. Alpin soils do not have dark reddish brown concretions in the underlying material, and Mandarin soils are somewhat poorly drained. Leon soils are poorly drained, and Murville soils are very poorly drained. Both of these soils are in narrow depressions. The included soils make up about 15 percent of this map unit.

This Kureb soil is used mainly as woodland. The major canopy trees consist of a sparse stand of longleaf pine, southern red oak, live oak, blackgum, and hickory. The understory is turkey oak, blackjack oak, bluejack oak, sassafras, pineland threeawn, panicum, and lichens (fig. 8). The main management concerns are droughtiness, poor trafficability because of the sandy surface layer, and a high seedling mortality rate.

This soil provides poor or very poor habitat for wildlife, such as deer, rabbit, fox, and quail.

This soil generally is not used as cropland. Droughtiness and leaching of plant nutrients are the main limitations. Soil blowing is a hazard.

The caving of ditchbanks and droughtiness are the main limitations affecting building site and recreational development. A poor filtering capacity and seepage are limitations affecting sanitary facilities. Lawns and shrubs are difficult to establish and maintain because of droughtiness. Irrigation, frequent applications of fertilizer, and additions of organic matter will increase plant growth.

The land capability classification is VIIs, and the woodland ordination symbol is 3S.

LnA—Leon fine sand, 0 to 2 percent slopes. This soil is poorly drained. It is in broad, smooth interstream areas. The mapped areas are irregular in shape and range mostly from 10 to 200 acres. A few areas in the southeastern part of the county can be as much as 900 acres.

Typically, the surface layer is very dark gray fine sand about 5 inches thick. The upper part of the subsurface layer, to a depth of 16 inches, is light gray fine sand. Separating the upper and lower parts of the subsurface layer, to a depth of 27 inches, is a subsoil layer of very dark gray, weakly cemented fine sand. The lower part of the subsurface layer is light gray, mottled fine sand. The next layer of the subsoil is dark reddish brown, weakly cemented fine sand, and the lower layer to a depth of 80 inches is dark reddish brown, mottled fine sand.

Infiltration is rapid, and surface runoff is slow. Permeability is rapid in the surface layer and moderate or moderately rapid in the subsoil. The available water capacity is very low. This soil is extremely acid to strongly acid except where lime has been added to the surface layer. The seasonal high water table is within a depth of 1 foot.

Included with this soil in mapping are small areas of Murville and Mandarin soils. Murville soils are very

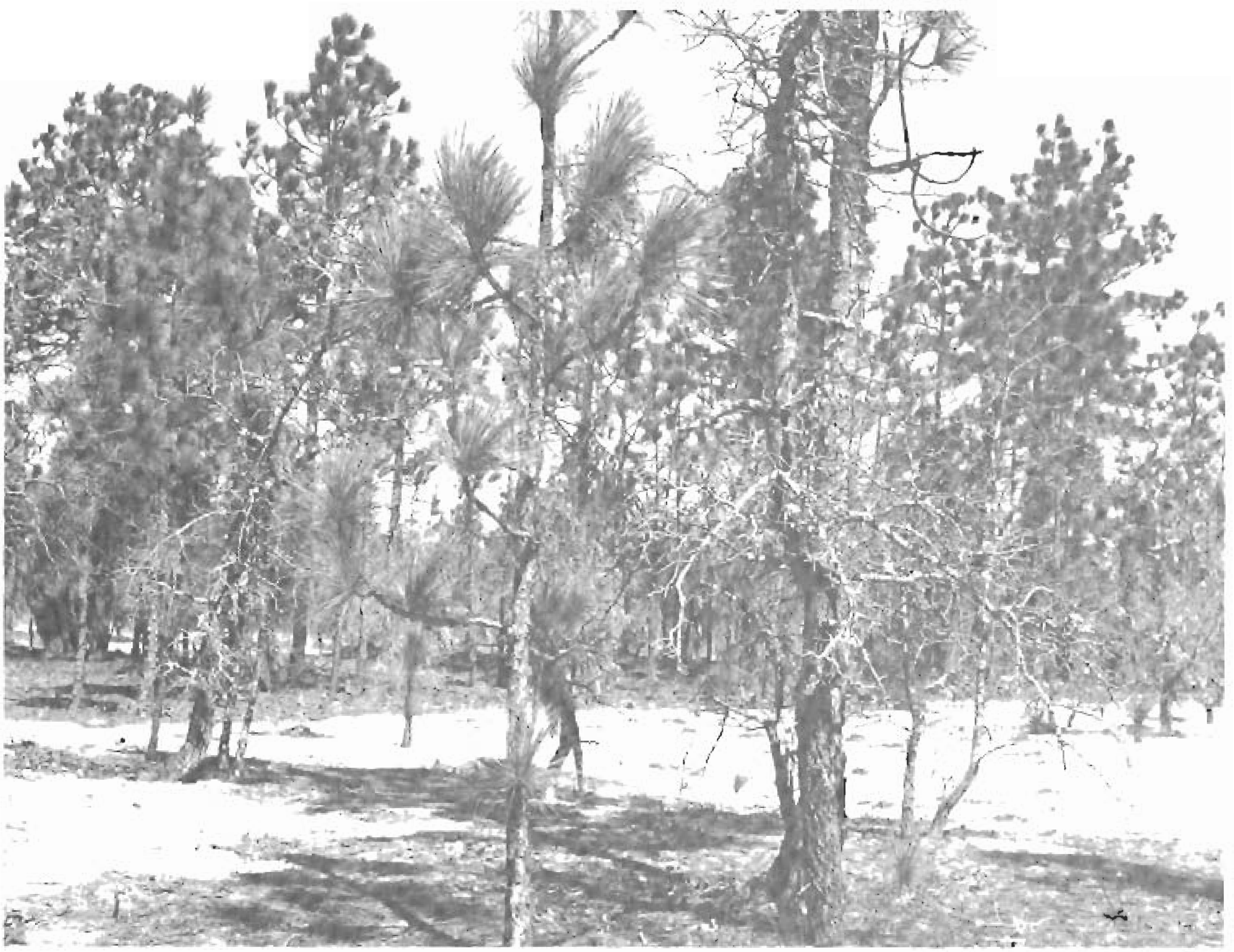


Figure 8.—An area of Kureb fine sand, 2 to 6 percent slopes, that supports a sparse stand of longleaf pine and turkey oak.

poorly drained and are in depressions. Mandarin soils are somewhat poorly drained and are slightly higher on the landscape than the Leon soil. The included soils make up about 20 percent of this map unit.

This Leon soil is used mainly as woodland. In a few small areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are longleaf pine, pond pine, sweetbay, redbay, blackgum, and red maple. The understory is pineland threeawn, bitter panicum, bluestem, pitcherplant, gallberry, huckleberry, cinnamon fern, brackenfern, waxmyrtle, blueberry, greenbrier, and sphagnum moss. Some large areas have been clearcut, ditched, bedded, and planted to loblolly pine. Drainage ditches are difficult to maintain because they have a tendency to cave. The weakly cemented subsoil restricts the penetration of tree roots in places.

This soil provides fair habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, opossum, black bear, and birds. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crop is blueberries. Seasonal wetness, a weakly cemented subsoil that restricts root penetration in places, droughtiness during

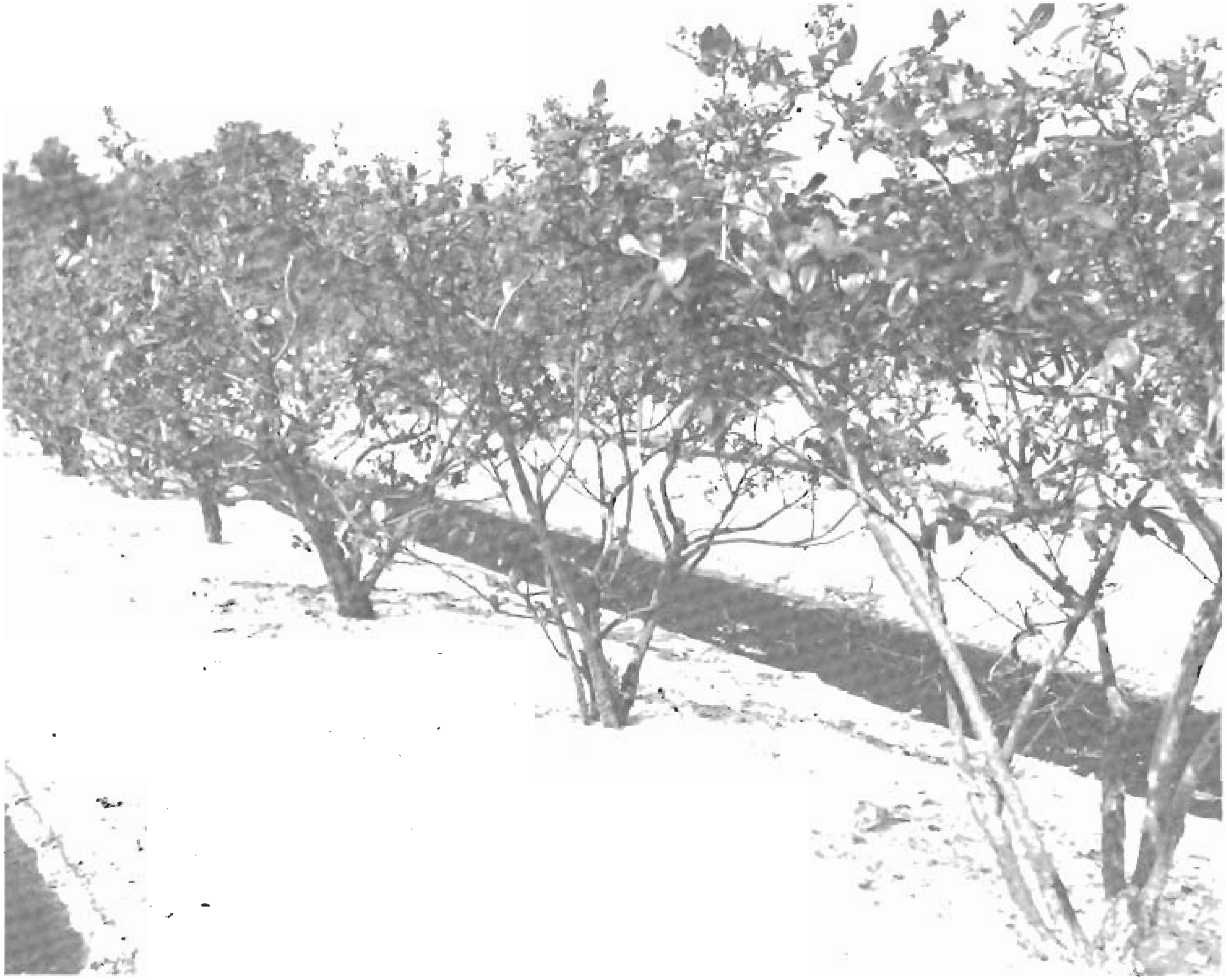


Figure 9.—If seasonal wetness is reduced by bedding and other drainage measures, blueberry production can be increased on Leon fine sand, 0 to 2 percent slopes.

the summer, caving of ditchbanks, and leaching of plant nutrients are the main limitations. Seasonal wetness can be reduced in areas used for blueberry production by bedding in rows and using open ditches (fig. 9). Mulching helps to conserve moisture during dry periods. If intensive management is applied and the peak productivity of plants is achieved, this soil usually will yield about 4,800 pounds of blueberries per acre, nonirrigated, and 9,600 pounds per acre, irrigated.

Seasonal wetness, caving of cutbanks, and droughtiness during the summer are the main limitations affecting building site development. Wetness and a poor filtering capacity are the main limitations affecting sanitary facilities. Seasonal wetness can be reduced by installing tile drains. Even after this soil is drained, wetness, caving of cutbanks, and the poor filtering capacity are persistent problems that will affect some sanitary facilities. Recreational development is limited by wetness and the sandy soil texture.

The land capability classification is IVw, and the woodland ordination symbol is 5W.

Ls—Liddell silt loam. This soil is poorly drained. It is in broad, smooth interstream areas and at times is ponded. The mapped areas are long and broad and range from 500 to 6,000 acres. The larger acreages are in the Penderlea and Burgaw areas. The slopes range from 0 to 2 percent.

Typically, the surface layer is dark gray silt loam about 8 inches thick. The subsoil, to a depth of 50 inches, is light brownish gray and gray, mottled silt loam. The substratum to a depth of 80 inches is light gray, mottled silt loam.

Infiltration is medium, and surface runoff is slow. Permeability is moderate. The available water capacity is high. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is within a depth of 1.5 feet.

Included with this soil in mapping are small intermingled areas of Woodington, Grantham, and Rains soils. All of these soils are in landscape positions similar to those of the Liddell soil. Woodington and Rains soils are less silty than the Liddell soil, and Grantham soils have more clay in the subsoil. The included soils make up about 25 percent of this map unit.

About one-half of the acreage of this Liddell soil is used as woodland. A large acreage near Penderlea is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, red maple, willow oak, sweetgum, swamp chestnut oak, and water oak. The understory is redbay, sweetbay, fetterbush lyonia, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, poison ivy, grape, cinnamon fern, brackenfern, and greenbrier. Some large areas have been clearcut, ditched, bedded, fertilized, and planted to loblolly pine. Logging when this soil is wet causes compaction, creates deep ruts, and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, opossum, black bear, and birds. The large wooded areas are used for hunting game animals.

Where this soil is drained and cultivated, the main crops are corn, soybeans, and truck crops (fig. 10). Seasonal wetness is the main limitation. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Silt can enter the tile as the soil dries, and it will eventually clog the tile. Conservation tillage, cover crops, and crop residue management will help conserve moisture during the summer and reduce leaching of plant nutrients.

Seasonal wetness is the main limitation affecting building site development, sanitary facilities, and recreational development. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Silt can enter the tile as the soil dries, and it eventually will clog the tile.

The land capability classification is IIIw in drained areas and VIw in undrained areas. The woodland ordination symbol is 9W.

Lu—Lumbee fine sandy loam, occasionally flooded. This soil is poorly drained. It is in slight depressions on stream terraces. Most areas are occasionally flooded by shallow stream overflow. In low areas, this soil is subject to ponding for brief periods. The mapped areas are long and narrow and range from 5 to 100 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sandy loam about 7 inches thick. The subsurface layer, to a depth of 13 inches, is grayish brown fine sandy loam. The subsoil extends to a depth of about 35 inches. The upper part is grayish brown, mottled sandy clay loam. The lower part is grayish brown, mottled sandy loam that has thin layers of sandy clay loam. The substratum to a depth of 60 inches is grayish brown loamy sand and sand.

Infiltration is medium, and surface runoff is very slow. Permeability is moderate. The available water capacity is low or moderate. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is at or near the surface.

Included with this soil in mapping are small intermingled areas of Johns soils. These soils are somewhat poorly drained or moderately well drained and are higher on the landscape than the Lumbee soil. Also included are some small areas of very poorly drained soils in the lower positions on the landscape. The included soils make up about 20 percent of this map unit.

This Lumbee soil is used mainly as woodland. In a few small areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, red maple, willow oak, sweetgum, swamp chestnut oak, and water oak. The understory is redbay, sweetbay, fetterbush lyonia, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, poison ivy, grape, cinnamon fern, brackenfern, and greenbrier. Some large areas have been clearcut, ditched, bedded, fertilized, and planted to

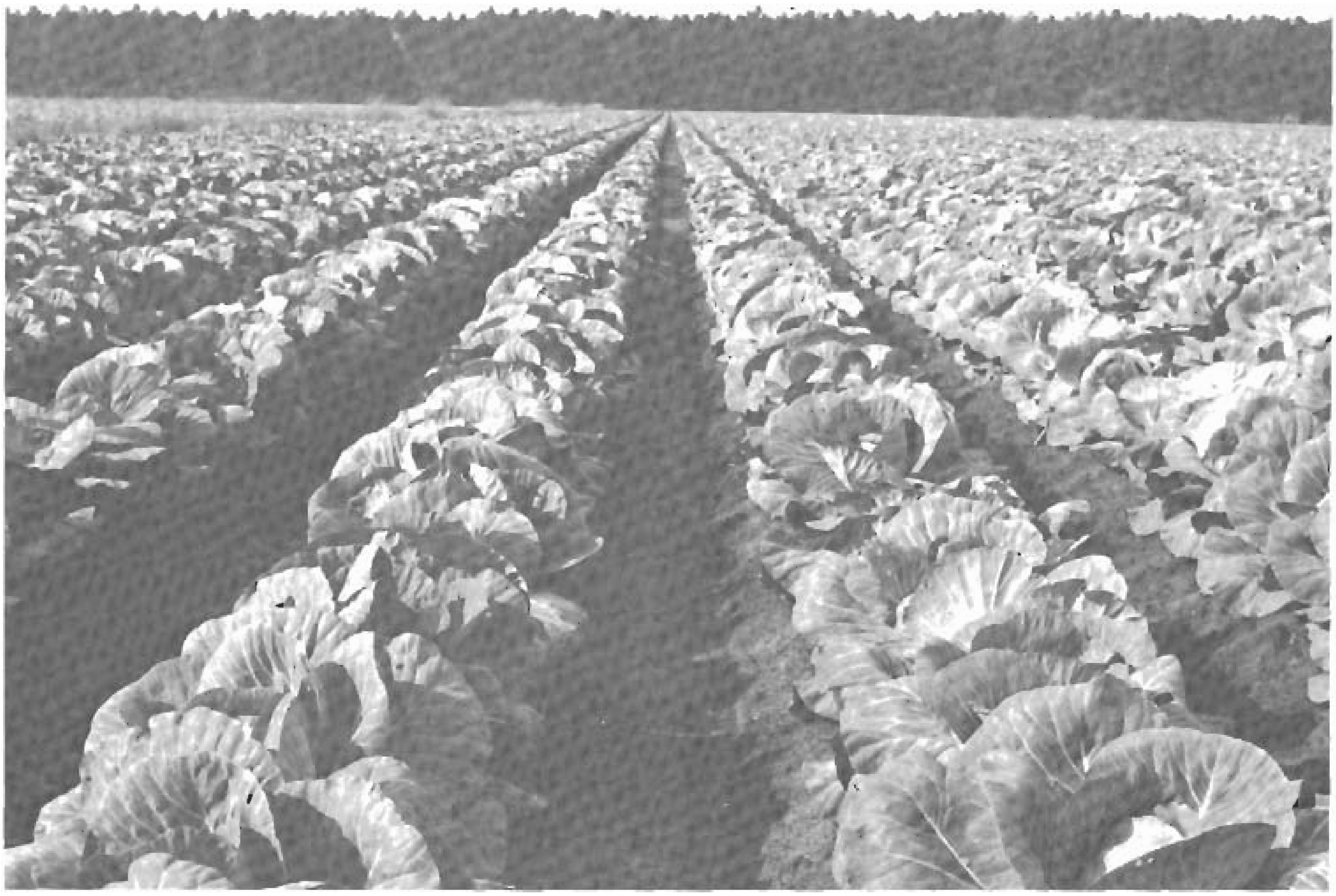


Figure 10.—Truck crops, such as cabbage, grow well in drained areas of Liddell silt loam.

loblolly pine. Logging when this soil is wet causes compaction, creates deep ruts, and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, opossum, black bear, and birds. The large wooded areas are used for hunting game animals.

Where this soil is drained and cultivated, corn and soybeans are the main crops. Seasonal wetness is the main limitation. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Ditches are difficult to maintain because they tend to cave. Conservation tillage, cover crops, and crop residue management will help conserve moisture during the summer and reduce leaching of plant nutrients.

Ditchbank caving and seasonal wetness are the main limitations affecting building site development. Flooding is a hazard. Installation of sanitary facilities is limited because of flooding, seasonal wetness, and seepage below a depth of 40 inches. Recreational development is limited by seasonal wetness and by flooding. Wetness can be reduced by land grading that helps to remove excess water and by tile drains and open ditches. The caving of ditchbanks below a depth of 40 inches will reduce the capacity of open ditches. Even if this soil is drained, the high water table is a continuing problem that will affect some sanitary facilities.

The land capability classification is IIIw in drained areas and VIw in undrained areas. The woodland ordination symbol is 9W.

Ma—Mandarin fine sand. This soil is somewhat poorly drained. It is in slightly elevated areas on broad interstream divides. The mapped areas are irregular in shape and range from 5 to 200 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is gray fine sand about 4 inches thick. The subsurface layer, to a depth of 19 inches, is light gray fine sand. The subsoil extends to a depth of about 40 inches. It is weakly cemented, mottled fine sand. The upper part is dark reddish brown, and the lower part is pale brown. The upper part of the substratum is light gray, mottled sand. The lower part to a depth of 80 inches is light brownish gray sand.

Infiltration is rapid, and surface runoff is slow. Permeability is moderate. The available water capacity is low. This soil is extremely acid to medium acid in the surface and subsurface layers and in the upper part of the subsoil except where lime has been added to the surface layer. It is extremely acid to neutral in the lower part of the subsoil and in the substratum. The seasonal high water table is 1.5 to 3.5 feet below the surface.

Included with this soil in mapping are small areas of Leon and Murville soils. Leon soils are poorly drained and are lower on the landscape than the Mandarin soil. Murville soils are very poorly drained and are in narrow drainageways. The included soils make up about 20 percent of this map unit.

This Mandarin soil is used mainly as woodland. In a few areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are longleaf pine, sweetgum, blackgum, turkey oak, blackjack oak, and southern red oak. The understory is dwarf azalea, wire grass, American holly, gallberry, huckleberry, waxmyrtle, creeping blueberry, greenbrier, pineland threeawn, panicum, brackenfern, bluestem, and lichens. A few areas have been bedded, clearcut, and planted to loblolly pine. A high rate of seedling mortality and the sandy surface layer are the main management concerns. Also, the weakly cemented subsoil restricts tree root penetration in places.

This soil provides poor habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, opossum, black bear, and birds. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crop is blueberries. Seasonal wetness, a weakly cemented subsoil that restricts root penetration in places, droughtiness during the summer, caving of ditchbanks, and leaching of plant nutrients are the main limitations. Seasonal wetness can be reduced in areas used for blueberry production by bedding in rows and by using open ditches. Mulching helps to conserve moisture during dry periods. If intensive management is applied and the peak productivity of plants is achieved, this soil usually will yield about 4,800 pounds of blueberries per acre, nonirrigated, and 9,600 pounds per acre, irrigated.

The caving of cutbanks and seasonal wetness are the main limitations affecting building site development. Seasonal wetness, a poor filtering capacity, and seepage are limitations affecting sanitary facilities. Landscaping is limited by the sandy soil material and droughtiness. Recreational development is limited by the sandy soil material. Seasonal wetness can be reduced by installing open drainage ditches. The caving of cutbanks will increase the need for maintenance of open ditches. Seepage and ground water contamination are continuing limitations affecting the installation of sanitary facilities. Irrigation and the addition of organic matter may be needed for plant growth.

The land capability classification is VIs, and the woodland ordination symbol is 4S.

McC—Marvyn and Craven soils, 6 to 12 percent slopes. The soils in this map unit are on side slopes on the uplands. The Marvyn soil is well drained, and the Craven soil is moderately well drained. These soils were not mapped separately because they react similarly to most kinds of use and management. Some areas contain only the Marvyn soil, and a few areas contain only the Craven soil. Most areas, however, contain both soils. The mapped areas are long and narrow and range from 5 to 25 acres.

The Marvyn soil makes up about 60 percent of the map unit, and the Craven soil makes up about 25 percent. The included soils make up about 15 percent.

Typically, the Marvyn soil has a surface layer of dark grayish brown loamy fine sand about 5 inches thick. The subsurface layer, to a depth of 12 inches, is light yellowish brown loamy fine sand. The subsoil extends to a depth of 55 inches. The upper part is yellowish brown, sandy clay loam. The middle part is yellowish brown, mottled sandy clay loam. The lower part is brownish yellow, mottled sandy loam. The substratum to a depth of 80 inches is pale brown, reddish yellow, and light gray loamy sand.

Infiltration in the Marvyn soil is rapid or medium, and surface runoff is medium. Permeability is moderate. The available water capacity also is moderate. This soil is very strongly acid to medium acid except where lime has been added to the surface layer. The seasonal high water table is below a depth of 6 feet.

Typically, the Craven soil has a surface layer of brown loam about 2 inches thick. The subsurface layer, to a depth of 6 inches, is light yellowish brown loam. The subsoil extends to a depth of 50 inches. In sequence downward, it is brownish yellow clay; reddish yellow, mottled clay loam; gray, mottled clay loam; and light gray, mottled sandy clay loam. The substratum to a depth of 80 inches is mottled light gray, brownish yellow, and red sandy loam that has thin layers of loamy sand and sandy clay loam.

Infiltration in the Craven soil is medium or slow, and surface runoff is medium. Permeability is slow. The available water capacity is moderate. The shrink-swell potential also is moderate. This soil is extremely acid to strongly acid except where lime has been added to the surface layer. The seasonal high water table is 2 to 3 feet below the surface.

Included in mapping are small intermingled areas of Norfolk, Autryville, and Aycock soils and some narrow strips of Muckalee soils. Norfolk, Autryville, and Aycock soils are in positions on the landscape similar to those of the Marvyn and Craven soils. The subsoil of Norfolk soils has less clay than that of the Craven soil and is thicker than that of the Marvyn soil. Autryville soils have a thick, sandy surface layer and subsurface layer. Aycock soils have more silt in the subsoil than the Marvyn or Craven soils. Muckalee soils are in narrow drainageways. Also included are some areas of soils that have short slopes of more than 12 percent. These soils are in narrow bands along some drainageways.

The Marvyn and Craven soils are used mainly as woodland. In a few small areas, they are used as cropland.

Where these soils are used as woodland, the major canopy trees are loblolly pine, longleaf pine, red oak, white oak, blackgum, American redcedar, and hickory. The understory is American holly, dogwood, blueberry, honeysuckle, black cherry, grape, sweet pepperbush, poison ivy, and greenbrier.

In areas of openland and woodland, these soils provide good habitat for wildlife, such as deer, squirrel, rabbit, fox, and quail.

In cultivated areas, the main crops are pasture grasses, hay, corn, and soybeans. Because they are strongly sloping and are in narrow areas, these soils are difficult to manage. Conservation tillage, cover crops, contour cultivation, and crop residue management will reduce the hazard of erosion.

The slope of both soils, slope is the main limitation affecting building site development. Additional limitations of the Craven soil are a seasonal high water table, low soil strength, and a moderate shrink-swell potential in the subsoil. Maintaining a plant cover during construction reduces the hazard of erosion. The moderate permeability of the subsoil in the Marvyn soil is the main limitation affecting the installation of sanitary facilities. The Craven soil is even more limited as a site for sanitary facilities because of the slowly permeable subsoil and the seasonal high water table. The slope causes lateral seepage of effluent, especially in the Craven soil. In areas of the Marvyn soil, the slope is the main limitation affecting recreational development. Slope, wetness, and slow permeability are limitations that affect recreational development of the Craven soil.

The land capability classification of these soils is VIe. The woodland ordination symbol is 9A for the Marvyn soil and 8W for the Craven soil.

Me—Meggett loam. This soil is nearly level and poorly drained. It is in slight depressions on the uplands and is subject to rare flooding. In places, it is ponded for long periods. The mapped areas generally are long and irregular in shape and range from 10 to 200 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is dark grayish brown loam about 6 inches thick. The subsoil extends to a depth of 57 inches. It is gray and mottled. The upper part is clay loam. The middle part is sandy clay. The lower part is clay. The substratum extends to a depth of 75 inches. It is dark gray clay in the upper part and gray loamy fine sand in the lower part. In places, the substratum is marl.

Infiltration is slow, and surface runoff is slow to ponded. Permeability is slow. The available water capacity is high. The shrink-swell potential is high in the subsoil. This soil is very strongly acid to neutral in the surface layer and in the upper part of the subsoil and is slightly acid to moderately alkaline in the lower part of the subsoil and in the substratum. The seasonal high water table is at or near the surface.

Included with this soil in mapping are small intermingled areas of Grifton and Invershiel soils. Grifton soils are in positions on the landscape similar to those of the Meggett soil. They have less clay in the subsoil than the Meggett soil. Ivershiel soils are moderately well drained and are in the higher landscape positions. Also included are some areas of soils that are more strongly acid in the lower part of the subsoil than the Meggett soil. The included soils make up about 15 percent of this map unit.

This Meggett soil is used mainly as woodland. In a few small areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are water oak, willow oak, loblolly pine, sweetgum, and red maple. The understory is saw palmetto, redbay, sweetbay, American holly, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, and greenbrier. Some areas have been clearcut, ditched, bedded, and planted to loblolly pine. Logging when this soil is wet causes compaction, creates deep ruts, and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, opossum, squirrel, and birds.

Where this soil is drained and cultivated, the main crops are corn, soybeans, and small grains. Seasonal wetness and slow permeability are the main limitations. Wetness can be reduced by land grading that helps to remove excess surface water and by open ditches. Conservation tillage, cover crops, and crop residue management will improve tilth and conserve moisture during the summer.

This soil generally is not used for building site development, sanitary facilities, or recreational development. Seasonal wetness, slow permeability, and the content of clay and high shrink-swell potential in the subsoil are the main limitations. Wetness can be reduced by land grading that helps to remove excess surface water and by open ditches. Even if this soil is drained, the other limitations are continuing problems that will affect building site development and sanitary facilities.

The land capability classification is IVw in undrained areas and IIIw in drained areas. The woodland ordination symbol is 9W.

Mk—Muckalee loam, frequently flooded. This soil is poorly drained. It is on the flood plains and is frequently flooded for brief periods. The overflow water ponds in wide, flat areas during the winter. The mapped areas are long and narrow and generally range from 150 to 1,000 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is dark grayish brown loam about 12 inches thick. The upper part of the underlying material is dark grayish brown, mottled sandy loam. The middle part is dark grayish brown loamy sand that has thin strata of sandy loam. The lower part to a depth of 60 inches is light brownish gray loamy sand that has thin strata of sand and loam.

Infiltration is medium, and surface runoff is very slow. Permeability is moderate. The available water capacity also is moderate. This soil is strongly acid to neutral in the surface layer and medium acid to moderately alkaline in the underlying material. The seasonal high water table is 0.5 foot to 1.5 feet below the surface.

Included with this soil in mapping are some small narrow strips of sandy soils. These soils are better drained than the Muckalee soil. They are near streambanks. Also included, on wide flood plains, are some areas of soils that have a thick, mucky surface layer. The included soils make up about 35 percent of this map unit.

This Muckalee soil is used mainly as woodland. The major canopy trees are loblolly pine, green ash, sweetgum, water oak, eastern cottonwood, blackgum, black tupelo, willow oak, red maple, sweetbay, loblolly bay, and baldcypress. The understory is greenbrier, rattan, sphagnum moss, royal fern, gallberry, longleaf uniola, panicum, and honeysuckle. The main management concerns are wetness, flooding, and low soil strength. The use of logging equipment when the soil is wet creates deep ruts and damages tree roots.

This soil provides fair or poor habitat for wildlife, such as deer, raccoon, opossum, fox, rabbit, bobcat, black bear, and ducks. The large wooded areas are used for hunting game animals.

Because of flooding and the high water table, this soil is not suitable for cropland and is not used for building site development, sanitary facilities, or recreational development.

The land capability classification is Vw, and the woodland ordination symbol is 7W.

Mu—Murville muck. This soil is very poorly drained. It is in upland interstream areas and in depressions. At times, this soil may be ponded. The mapped areas are generally long and irregular in shape and range from 20 to 800 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is covered with decomposed leaves and twigs about 4 inches thick. The upper part of the surface layer is black muck about 3 inches thick. The lower part, to a depth of about 11 inches, is black mucky fine sand. The subsoil, to a depth of 49 inches, is black fine sand. The upper part of the substratum is grayish brown loamy fine sand. The lower part to a depth of 80 inches is mottled grayish brown and light gray fine sand. In places, this soil does not have a thin surface layer of muck.

Infiltration is medium, and surface runoff is slow. Permeability is moderately rapid. The available water capacity is moderate. This soil is extremely acid to strongly acid. The seasonal high water table is within 1 foot of the surface.

Included with this soil in mapping are small intermingled areas of Croatan and Torhunta soils and a few narrow intermingled areas of Leon soils. Croatan and Torhunta soils are in positions on the landscape similar to those of the Murville soil. Croatan soils have muck layers that are thicker than those of the Murville soil, and Torhunta soils have a loamy subsoil. Leon soils are in the slightly higher positions on the landscape and are poorly drained. The included soils make up about 15 percent of this map unit.

This Murville soil is used mainly as woodland. In a few small areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are pond pine, water tupelo, Atlantic white cedar, sweetgum, yellow poplar, red maple, and baldcypress. The understory is redbay, sweetbay, loblolly bay, gallberry, titi, southern bayberry, fetterbush lyonia, sweet pepperbush, pitcherplant, Venus's-flytrap, sundew, cinnamon fern, brackenfern, waxmyrtle, blueberry, greenbrier, and sphagnum moss. Large areas have been clearcut, ditched, bedded, fertilized, and planted to loblolly pine. The use of logging equipment is limited because of the high content of organic matter in the surface layer and low soil strength. Water is on or near the surface most of the year.

This soil provides poor habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, black bear, opossum, and birds. The large wooded areas are used for hunting game animals.

Where this soil is drained and cultivated, the main crops are corn, soybeans, and blueberries. Seasonal wetness and caving of ditchbanks are the main limitations. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. In areas used for blueberry production, bedding in rows will reduce the wetness. The subsoil can become weakly cemented as it dries. If intensive management is applied and the peak productivity of plants is achieved, this soil usually will yield about 4,800 pounds of blueberries per acre, nonirrigated, and 9,600 pounds per acre, irrigated.

This soil generally is not used for building site development, sanitary facilities, or recreational development. Seasonal wetness, caving of ditchbanks, a poor filtering capacity, seepage, and ponding are the main limitations. Even if this soil is drained, wetness is a continuing problem that will affect most urban uses.

The land capability classification is Vw, and the woodland ordination symbol is 4W.

NhC—Newhan fine sand, dredged, 2 to 10 percent slopes. This excessively drained, sandy soil is in areas of dredge spoil. It is on both sides of the intracoastal waterway and in a few areas along the Cape Fear River. These areas are surrounded by water or by marsh. Small areas are cone-shaped, and large areas are irregular in shape. A dike surrounds the perimeter of the dredge spoil. The mapped areas range from 3 to 25 acres.

Typically, the surface layer is grayish brown fine sand about 2 inches thick. The upper part of the underlying material is light gray fine sand. The middle part is very pale brown fine sand. The lower part to a depth of 70 inches is light gray sand.

Infiltration is rapid, and surface runoff is slow. Permeability is very rapid. The available water capacity is very low. This soil is extremely acid to mildly alkaline. The seasonal high water table is at a depth of more than 6 feet.

Included with this soil in mapping are some areas of sandy soils that have thin strata of loamy and clayey sediments in the underlying material. Also included are small areas of clayey dredge material. The included soils make up about 20 percent of this map unit.

Nearly all areas of this Newhan soil support native vegetation, mainly loblolly pine, poison ivy, blackgum, red maple, sweetgum, seacoast bluestem, American beachgrass, yaupon holly, waxmyrtle, American redcedar, and live oak.

The wildlife that occasionally use areas of this soil are white-tailed deer, raccoon, cottontail rabbit, eastern brown pelican, least tern, and bobwhite quail.

This soil generally is not used as cropland or commercial woodland because of droughtiness, exposure to salt spray, and rapid leaching of plant nutrients.

This soil generally is not used for building site development. The caving of ditchbanks, seepage, the sandy soil material, a poor filtering capacity, and droughtiness are the main limitations affecting building site development, sanitary facilities, and recreational development.

The land capability classification is VIIIs. This soil has not been assigned a woodland ordination symbol.

NkE—Newhan-Corolla complex, 0 to 30 percent slopes. The soils in this map unit are on the Outer Banks. They are subject to wave overwash during hurricanes. The Newhan soil is excessively drained. It is on ridges and side slopes. It has slopes ranging from 2 to 30 percent. It is subject to soil blowing. The Corolla soil is moderately well drained or somewhat poorly drained. It is in depressions and nearly level areas. It has slopes ranging from 0 to 6 percent. The individual areas of these soils are too small or too mixed to be mapped separately at the scale used. The elevation of this map unit ranges from 5 to 30 feet. The mapped areas are long and narrow and range from 100 to 500 acres.

The Newhan soil makes up about 45 percent of this map unit, and the Corolla soil makes up about 35 percent. The included soils make up about 20 percent.

Typically, the Newhan soil has a surface layer of grayish brown fine sand about 2 inches thick. The upper part of the underlying material is light gray fine sand. The next part is very pale brown fine sand. The lower part to a depth of 70 inches is light gray sand.

Infiltration in the Newhan soil is very rapid, and surface water runoff is slow. Permeability is very rapid. The available water capacity is very low. This soil is extremely acid to mildly alkaline. The seasonal high water table remains below a depth of 6 feet.

Typically, the Corolla soil has a surface layer of grayish brown fine sand about 2 inches thick. The upper part of the underlying material is very pale brown and light gray fine sand. The next part is light gray, mottled fine sand. The lower part to a depth of 70 inches is mottled light gray and light brownish gray sand.

Infiltration in the Corolla soil is very rapid, and surface water runoff is slow. Permeability is very rapid. The available water capacity is very low. This soil is moderately acid to mildly alkaline. The seasonal high water table is 1.5 to 3.0 feet below the surface.

Included in mapping are some small areas of poorly drained, sandy soils in depressions; narrow, smooth strips of beach; and the Newhan soils that are adjacent to the beach and have very steep slopes. The included soils make up about 20 percent of this map unit.

The Newhan and Corolla soils are used mainly for building site development or recreational areas.

The native vegetation is mainly seaoats, seacoast bluestem, American beachgrass, American redcedar, bitter panicum, poison ivy, greenbrier, and live oak. There are almost no canopy trees.

The wildlife that occasionally use areas of these soils are white-tailed deer, raccoon, loggerhead turtle, cottontail rabbit, eastern brown pelican, least tern, and bobwhite quail.

These soils are not used as cropland or commercial woodland because of droughtiness, exposure to salt spray (fig. 11), and rapid leaching of plant nutrients.

The caving of ditchbanks is the main limitation affecting building site development. Flooding during hurricanes is a hazard. The Newhan soil is also limited by slopes of more than 15 percent, and the Corolla soil is limited by seasonal wetness.

During construction, minimal vegetation should be removed and permanent windbreaks should be established. Lawns and shrubs are difficult to establish and maintain because of droughtiness. Irrigation, frequent applications of fertilizer, and additions of organic matter will increase plant growth. Maintaining vegetation on the frontal dunes decreases the hazards of soil blowing and wave damage during hurricanes. The construction of walk-overs will help maintain these frontal dunes. The seepage of effluent and a poor filtering capacity are the main limitations affecting sanitary facilities. The slope of the Newhan soil and seasonal wetness in the Corolla soil are additional limitations. Flooding is a hazard. Drainage systems may not function properly because of tidewater inundation. The sandy soil material and slope are limitations affecting recreational development. Flooding is a hazard.

The land capability classification of the Newhan soil is VIIIs, and that of the Corolla soil is VIIw. These soils have not been assigned a woodland ordination symbol.

NmE—Newhan-Corolla-Urban land complex, 0 to 30 percent slopes. This map unit is on Topsail Island. The Newhan and Corolla soils are subject to wave overwash during hurricanes. They are also subject to soil blowing. Many ridges in areas of the Newhan soil have been cut or leveled, and areas of the Corolla soil have been filled. These modified areas are used as sites for buildings, such as beach houses, motels, and condominiums. The Newhan soil is excessively drained. It is on gently sloping to moderately steep natural ridges and low hills. The Corolla soil is moderately well drained or somewhat poorly drained. It is in nearly level areas and in areas that have been smoothed for future building sites. The individual areas of the soils and Urban land in this map unit are too small or too mixed to be mapped separately at the scale used. The mapped areas are irregular in shape and range from 10 to 300 acres.

The Newhan soil makes up about 35 percent of this map unit. The Corolla soil makes up 35 percent, and Urban land makes up about 25 percent. The included soils make up about 5 percent.

Typically, the Newhan soil has a surface layer of grayish brown fine sand about 2 inches thick. The upper part of the underlying material is light gray fine sand. The next part is very pale brown fine sand. The lower part to a depth of 70 inches is light gray sand.

Infiltration in the Newhan soil is very rapid, and surface runoff is slow. Permeability is very rapid. The available water capacity is very low. This soil is extremely acid to mildly alkaline. The seasonal high water table is below a depth of 6 feet.

Typically, the Corolla soil has a surface layer of grayish brown fine sand about 2 inches thick. The upper part of the underlying material is very pale brown and

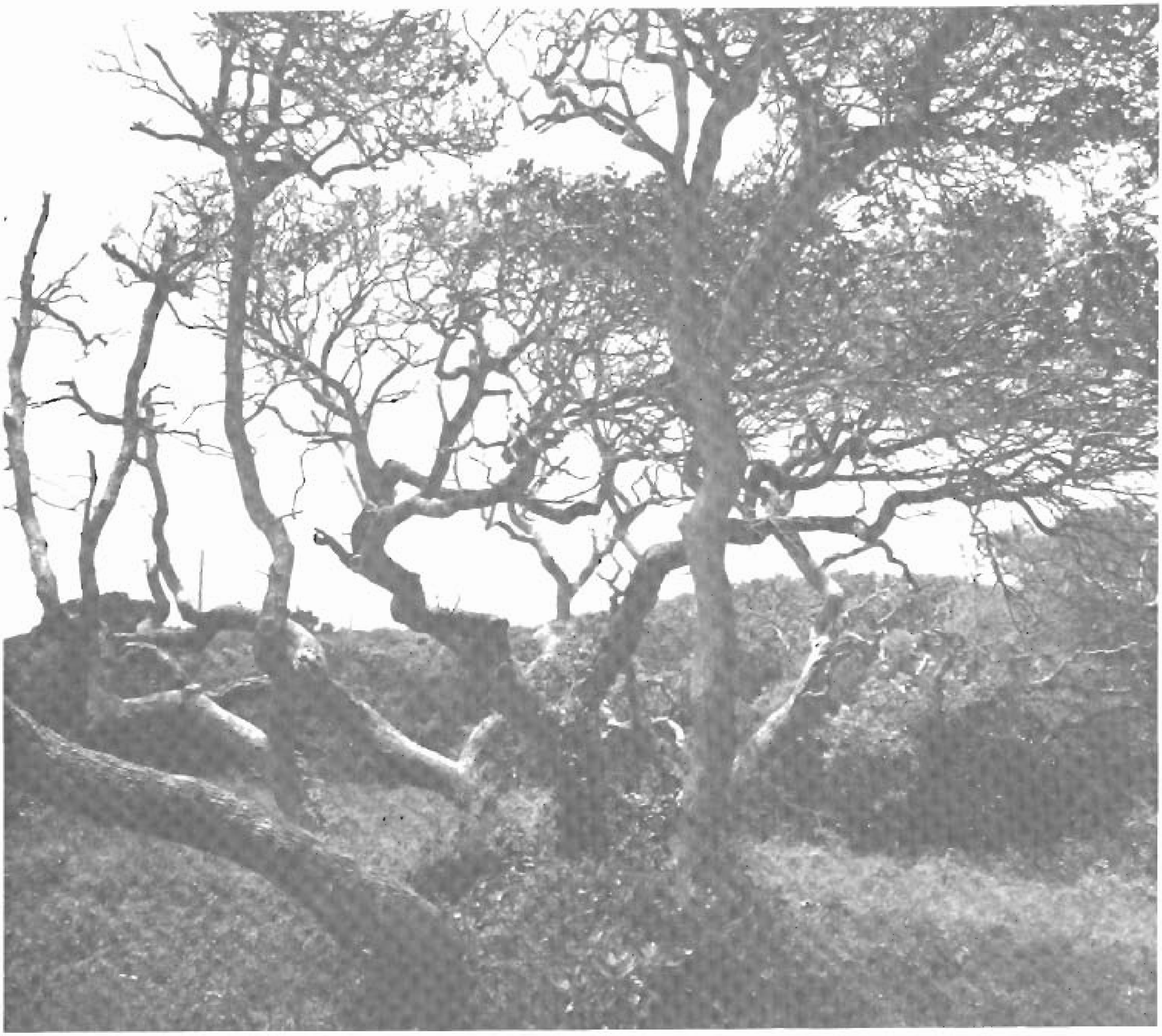


Figure 11.—This live oak, in an area of Newhan-Corolla complex, 0 to 30 percent slopes, is being shaped by salt spray that is carried by prevailing winds.

light gray fine sand. The next part is light gray, mottled fine sand. The lower part to a depth of 70 inches is mottled light gray and light brownish gray sand.

Infiltration in the Corolla soil is very rapid, and surface runoff is slow. Permeability is very rapid. The available water capacity is very low. This soil is medium acid to mildly alkaline. The seasonal high water table is 1.5 to 3.0 feet below the surface.

Urban land is covered by buildings, parking lots, streets, and roads.

Included in mapping are beaches and short slopes that are steep or very steep on the seaward side. These nearly vertical slopes are caused by storm wave erosion (fig. 12).

Vegetation on the Newhan and Corolla soils is sparse. It is mainly seaoats, seacoast bluestem, American beachgrass, yaupon holly, waxmyrtle, greenbrier, bitter panicum, poison ivy, and live oak. There are almost no canopy trees.

The caving of ditchbanks is the main limitation affecting building site development. The Newhan soil also is limited by slopes of more than 15 percent, and the Corolla soil is limited by seasonal wetness. Flooding is a hazard during hurricanes. Minimal vegetation should be removed during construction and permanent windbreaks should be established. Lawns and shrubs are difficult to establish and maintain because of droughtiness. Irrigation, frequent applications of fertilizer, and additions of organic matter will increase plant growth. Maintaining vegetation on the frontal dunes decreases the hazards of soil blowing and wave damage during hurricanes. The construction of walk-overs helps to maintain these frontal dunes. The seepage of effluent and a poor filtering capacity are the main limitations affecting sanitary facilities. The slope of the Newhan soil and seasonal wetness in the Corolla soil are additional limitations. Flooding is a hazard. Drainage systems may not function properly because of tidewater inundation. The sandy soil material and slope are limitations affecting recreational development.

The soils in this map unit have not been assigned a capability subclass or a woodland ordination symbol.

NoA—Norfolk loamy fine sand, 0 to 2 percent slopes. This soil is well drained. It is on slightly convex interstream divides near the major drainageways. The mapped areas are long and irregular in shape and range from 15 to 100 acres.

Typically, the surface layer is grayish brown loamy fine sand about 9 inches thick. The subsurface layer, to a depth of 12 inches, is very pale brown loamy fine sand. The upper part of the subsoil is yellowish brown sandy clay loam. The next part is yellowish brown and brownish yellow, mottled sandy clay loam. The lower part to a depth of 80 inches is brownish yellow, mottled sandy loam.

Infiltration is rapid or medium, and surface runoff is slow. Permeability is moderate. The available water capacity also is moderate. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is 4 to 6 feet below the surface.

Included with this soil in mapping are small areas of Goldsboro, Exum, Onslow, Foreston, Autryville, and Aycock soils. Goldsboro, Exum, Onslow, and Foreston soils are moderately well drained and are intermingled throughout the map unit in positions similar to those of the Norfolk soil. Autryville and Aycock soils are near the drainageways. Autryville soils have a thick, sandy surface layer and subsurface layer. Aycock soils have more silt in the subsoil than the Norfolk soil. Also included are small areas of eroded soils that are slightly steeper than the Norfolk soil. The included soils make up about 15 percent of this map unit.

This Norfolk soil is used mainly as cropland or for building site development. In a few areas, it is used as woodland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, red oak, white oak, hickory, and red maple. The understory is American holly, flowering dogwood, persimmon, black cherry, blackgum, waxmyrtle, blueberry, honeysuckle, dwarf azalea, lespedeza, grape, poison ivy, Virginia creeper, and greenbrier. Few limitations affect woodland management.

In areas of woodland and openland, this soil provides good habitat for wildlife, such as deer, rabbit, fox, and quail.

In cultivated areas, the main crops are tobacco, corn, soybeans, and small grains. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients.

This soil has few limitations affecting building site development, sanitary facilities, and recreational development. The seasonal high water table is the main limitation affecting building site development and sanitary facilities. Installing a drainage system that includes tile drains and open ditches will lower the seasonal high water table on sites for most urban uses.

The land capability classification is I, and the woodland ordination symbol is 9A.

NoB—Norfolk loamy fine sand, 2 to 6 percent slopes. This soil is well drained. It is on convex interstream divides near the major drainageways. The mapped areas are long and irregular in shape and range from 15 to 100 acres.

Typically, the surface layer is grayish brown loamy fine sand about 9 inches thick. The subsurface layer, to a depth of 12 inches, is very pale brown loamy fine sand. The upper part of the subsoil is yellowish brown sandy clay loam. The next part is yellowish brown and brownish yellow, mottled sandy clay loam. The lower part to a depth of 80 inches is brownish yellow, mottled sandy loam.

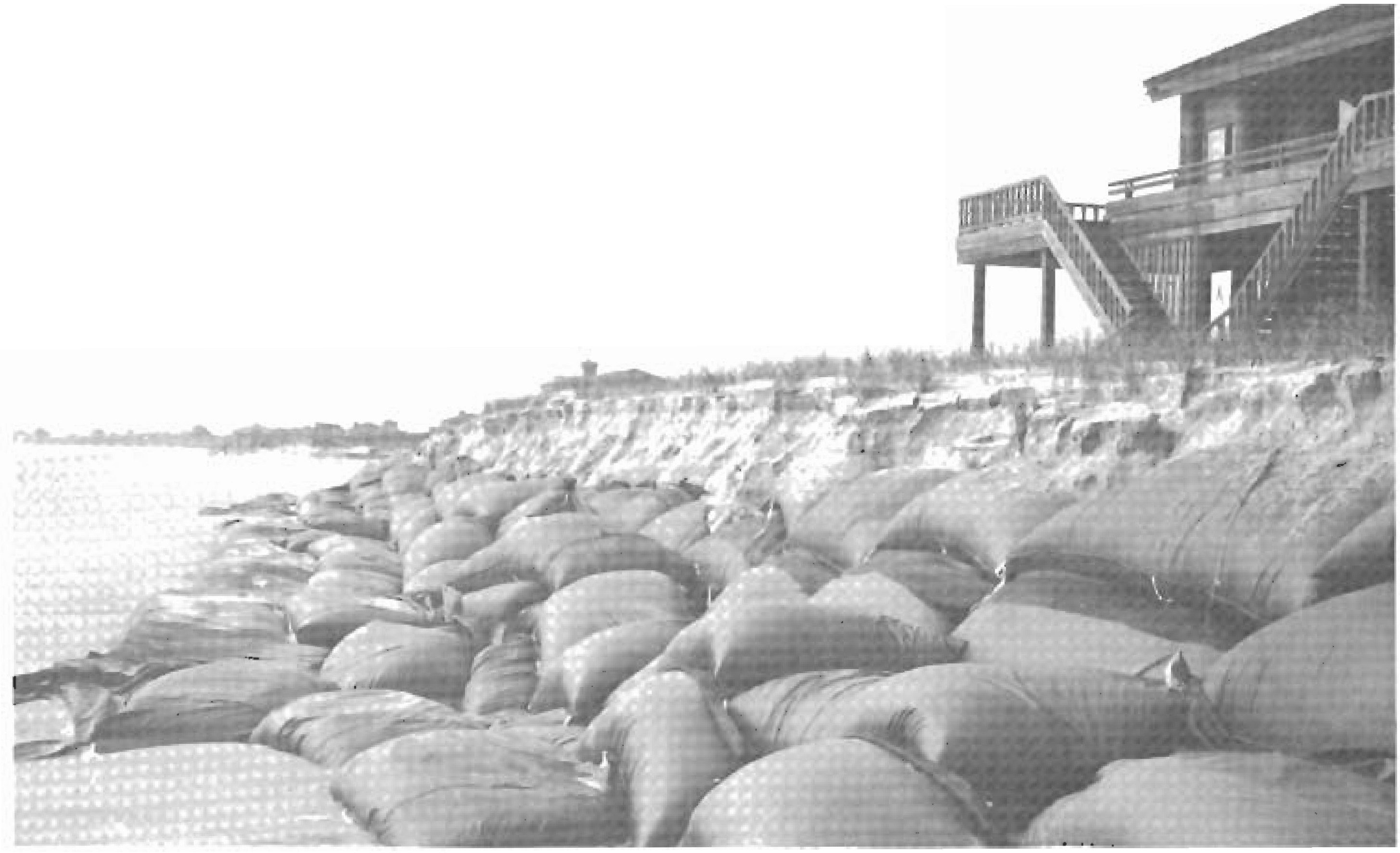


Figure 12.—Sand bags protect this part of the barrier ridge in an area of the Newhan-Corolla-Urban land complex that has been eroded by storm waves.

Infiltration is rapid or medium, and surface runoff is medium. Permeability is moderate. The available water capacity also is moderate. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is 4 to 6 feet below the surface.

Included with this soil in mapping are small areas of Goldsboro, Exum, Foreston, Autryville, Aycock, and Muckalee soils. Goldsboro, Exum, and Foreston soils are moderately well drained and are intermingled in the more nearly level areas. Autryville and Aycock soils are near the drainageways. Autryville soils have a thick, sandy surface layer and subsurface layer. Aycock soils have more silt in the subsoil than the Norfolk soil. Strips of Muckalee soils are in narrow drainageways. Also included are small areas of eroded soils and soils that have slopes of more than 6 percent. The included soils make up about 15 percent of this map unit.

This Norfolk soil is used mainly as cropland or for building site development. In a few areas, it is used as woodland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, red oak, white oak, hickory, and red maple. The understory is American holly, flowering dogwood, persimmon, black cherry, blackgum, waxmyrtle, blueberry, honeysuckle, dwarf azalea, lespedeza, grape, poison ivy, Virginia creeper, and greenbrier. Few limitations affect woodland management.

In areas of woodland and openland, this soil provides good habitat for wildlife, such as deer, rabbit, fox, and quail.

In cultivated areas, the main crops are tobacco, corn, soybeans, and small grains. Erosion is a hazard when this soil is used for row crops. Conservation tillage, cover crops, contour cultivation, and crop residue management will reduce the hazard of erosion, conserve moisture, and reduce leaching of plant nutrients.

This soil has few limitations affecting building site development, sanitary facilities, and recreational development; however, the seasonal high water table is a limitation affecting building site development and sanitary facilities. Installing a drainage system that includes tile drains and open ditches will lower the seasonal high water table on sites for most urban uses.

The land capability classification is IIe, and the woodland ordination symbol is 9A.

On—Onslow loamy fine sand. This soil is moderately well drained. It is on slightly convex uplands near shallow drainageways. The mapped areas are long and irregular in shape and range from 15 to 70 acres. The slopes range from 0 to 3 percent.

Typically, the surface layer is gray loamy fine sand about 4 inches thick. The subsurface layer extends to a depth of 17 inches. The upper part is brown loamy fine sand that has pockets of weakly cemented, dark reddish brown loamy fine sand. The lower part is light yellowish brown loamy fine sand. The subsoil extends to a depth of 63 inches. The upper part is brownish yellow, mottled fine sandy loam; the middle part is brownish yellow, mottled sandy clay loam; and the lower part is gray, mottled sandy clay loam. The substratum to a depth of 80 inches is gray, mottled clay loam that has pockets of sandy loam.

Infiltration is medium, and surface runoff is slow. Permeability is moderate. The available water capacity also is moderate. This soil is extremely acid to strongly acid except where lime has been added to the surface layer. The seasonal high water table is 1.5 to 3.0 feet below the surface.

Included with this soil in mapping are small areas of Goldsboro, Foreston, Baymeade, and Rains soils. Intermingled areas of Goldsboro and Foreston soils are in positions on the landscape similar to those of the Onslow soil. These soils do not have pockets of dark reddish brown, weakly cemented material. Baymeade soils are well drained and are near the drainageways. Rains soils are poorly drained and are in interstream areas and in slight depressions. The included soils make up about 25 percent of this map unit.

This Onslow soil is used mainly as woodland. In some areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, sweetgum, blackgum, southern red oak, white oak, yellow poplar, sycamore, American redcedar, red maple, hickory, willow oak, and water oak. The understory is American holly, gallberry, honeysuckle, dwarf azalea, sourwood, flowering dogwood, huckleberry, grape, persimmon, black cherry, waxmyrtle, blueberry, poison ivy, and greenbrier. Some large areas have been clearcut and planted to loblolly pine. Logging when the soil is wet creates ruts and damages tree roots.

This soil provides fair or good habitat for wildlife, such as deer, raccoon, fox, rabbit, squirrel, bobcat, opossum, and birds. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are tobacco, corn, soybeans, and small grains. Seasonal wetness limits aeration in the root zone. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients.

Seasonal wetness is the main limitation affecting building site development, sanitary facilities, and recreational development. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches.

The land capability classification is IIw, and the woodland ordination symbol is 7A.

PaA—Pactolus fine sand, 0 to 2 percent slopes. This soil is moderately well drained or somewhat poorly drained. It is in slight depressions on the uplands near the coast and on low ridges on terraces. The mapped areas are oblong and range from 10 to 150 acres.

Typically, the surface layer is dark grayish brown fine sand about 10 inches thick. The underlying material is fine sand to a depth of 80 inches. The upper part is brownish yellow, the middle part is yellow and light gray and has mottles, and the lower part is light brownish gray.

Infiltration is rapid, and surface runoff is slow. Permeability is rapid. The available water capacity is low. This soil is very strongly acid or strongly acid except where lime has been added to the surface layer. The seasonal high water table is 1.5 to 2.5 feet below the surface.

Included with this soil in mapping are small areas of Alpin, Mandarin, and Leon soils. Alpin soils are excessively drained and are on low ridges. Mandarin soils are somewhat poorly drained, and Leon soils are poorly drained. Both of these soils are in small depressions. Also included are soils in low-lying areas that are subject to occasional flooding. The included soils make up about 20 percent of this map unit.

This Pactolus soil is used mainly as woodland. In a few areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are longleaf pine, loblolly pine, southern red oak, willow oak, sweetgum, blackgum, water oak, and hickory. The understory is turkey oak, American holly, sassafras, persimmon, flowering dogwood, blueberry, inkberry, huckleberry, American redcedar, dwarf azalea, panicum, American beautyberry, grape, poison ivy, waxmyrtle, Virginia creeper, and lichens. Some areas have been clearcut and planted to loblolly pine. Summer droughtiness increases seedling mortality, and the sandy surface layer reduces trafficability.

This soil provides poor or fair habitat for wildlife, such as deer, rabbit, fox, opossum, bobcat, and quail. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are tobacco, sweet potatoes, corn, peanuts, and soybeans. Summer droughtiness and leaching of plant nutrients are the main limitations. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients. Windbreaks help control soil blowing.

The caving of ditchbanks is the main limitation affecting building site development. Seasonal wetness, seepage, and a poor filtering capacity are limitations affecting sanitary facilities. Seasonal wetness can be reduced by installing a drainage system that includes tile drains and open ditches. The caving of ditchbanks will increase the need for maintenance of open ditches. Lawns and shrubs are difficult to establish and maintain because of the sandy soil material and summer droughtiness. Irrigation, frequent applications of fertilizer, and additions of organic material will increase plant growth. The sandy soil material is a limitation affecting recreational development.

The land capability classification is IIIs, and the woodland ordination symbol is 8W.

Pn—Pantego mucky fine sandy loam. This soil is very poorly drained. It is in broad interstream areas. The soil is ponded during wet periods and is subject to rare flooding. The mapped areas are elongated and range from 10 to 300 acres. The slopes range from 0 to 2 percent.

Typically, the upper part of the surface layer is black mucky fine sandy loam about 10 inches thick. The lower part, to a depth of 24 inches, is very dark gray and dark grayish brown fine sandy loam. The subsoil extends to a depth of 59 inches. The upper part is dark grayish brown sandy clay loam. The lower part is gray, mottled sandy clay loam. The upper part of the substratum is gray, mottled clay loam that has thin layers of sandy clay loam. The lower part to a depth of 80 inches is gray sandy clay loam that has thin layers of loamy sand. In places, the upper part of the surface layer is fine sandy loam.

Infiltration is medium, and surface runoff is very slow. Permeability is moderate. The available water capacity is high or very high. This soil is extremely acid to strongly acid except where lime has been added to the surface layer. The seasonal high water table is within a depth of 1.5 feet.

Included with this soil in mapping are small areas of Torhunta, Woodington, and Rains soils. Torhunta soils are intermingled with areas of the Pantego soil. They have less clay in the subsoil than the Pantego soil. Woodington and Rains soils are near the outer edges of this map unit. Woodington soils have less clay in the subsoil than the Pantego soil. Rains soils are poorly drained. The included soils make up about 20 percent of this map unit.

This Pantego soil is used mainly as woodland. In a few areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, pond pine, sweetgum, water tupelo, yellow poplar, sycamore, swamp chestnut oak, red maple, willow oak, water oak, Atlantic white cedar, and baldcypress. The understory is redbay, sweetbay, loblolly bay, fetterbush lyonia, gallberry, southern bayberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, brackenfern, cinnamon fern, titi, greenbrier, and sphagnum moss. Large areas have been clearcut, ditched, bedded, fertilized, and planted to loblolly pine. The surface layer has a high content of organic matter. As a result, low soil strength is a limitation during wet periods and during the winter. Logging when this soil is wet creates ruts and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, black bear, rabbit, bobcat, opossum, and birds. The large wooded areas are used for hunting game animals.

Where this soil is drained and cultivated, corn and soybeans are the main crops. Seasonal wetness is the main limitation. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture during the summer and reduce leaching of plant nutrients.

This soil generally is not used for building site development, sanitary facilities, or recreational development. Seasonal wetness is the main limitation, and flooding is a hazard. Even if this soil is drained, wetness is a continuing problem that will affect the use of this soil for most kinds of urban development.

The land capability classification is VIw in undrained areas and IIIw in drained areas. The woodland ordination symbol is 9W.

Pt—Pits. This map unit consists of areas where the sandy soil material has been excavated to a depth of 10 to 30 feet. These areas range from 3 to 60 acres. The walls of the more recently excavated pits have been shaped to 2 to 1 or 3 to 1 slopes and have been seeded. Many pits have filled with ground water (fig. 13). A few pits near drainageways are naturally drained. Even when the pits are drained, the sandy soil material in the bottom generally is wet. Onsite investigation is needed before plans are made for the use and management of these areas.

This map unit has not been assigned a capability subclass or a woodland ordination symbol.

Ra—Rains fine sandy loam. This soil is poorly drained. It is in broad, smooth interstream areas and in depressions near drainageways. Surface water ponds in low areas for brief periods. The large expanses of this soil, ranging from 100 to 600 acres, are in the broad, smooth interstream areas. The small areas are in shallow depressions on slightly convex divides. These areas range from 5 to 10 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sandy loam about 4 inches thick. The subsurface layer extends to a depth of 14 inches. The upper part is gray fine sandy loam. The lower part is light brownish gray, mottled fine sandy loam. The subsoil extends to a depth of 68 inches. It is gray, mottled sandy clay loam. The substratum to a depth of 80 inches is gray, mottled sandy clay loam that has thin layers of sandy loam and sandy clay.

Infiltration is medium, and surface runoff is slow. Permeability is moderate. The available water capacity also is moderate. This soil is extremely acid to strongly acid except where lime has been added to the surface layer. The seasonal high water table is within a depth of 1 foot.

Included with this soil in mapping are small intermingled areas of Woodington, Liddell, Grantham, and Grifton soils and small areas of Goldsboro and Pantego soils. Woodington, Liddell, Grantham, and Grifton soil are in positions on the landscape similar to those of the Rains soil. Woodington soils have less clay in the subsoil than the Rains soil, Liddell and Grantham soils have more silt in the subsoil, and Grifton soils are less acid in the lower part of the subsoil and in the substratum. Goldsboro soils are moderately well drained and are along the outer edge of the map unit and near drainageways. Pantego soils are very poorly drained and are in small, shallow depressions. The included soils make up about 15 percent of this map unit.

This Rains soil is used mainly as woodland. In a few large areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, red maple, willow oak, sweetgum, swamp chestnut oak, and water oak. The understory is redbay, sweetbay, fetterbush lyonia, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, poison ivy, grape, cinnamon fern, brackenfern, and greenbrier. Some large areas have been clearcut, ditched, bedded, fertilized, and planted to loblolly pine. Logging when the soil is wet causes compaction, creates deep ruts, and damages tree roots.

This soil provides fair or good habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, opossum, black bear, and birds. The large wooded areas are used for hunting game animals.

In cultivated areas, the main crops are corn and soybeans. Seasonal wetness is the main limitation. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture and reduce leaching of plant nutrients.

Seasonal wetness is the main limitation affecting building site development, sanitary facilities, and recreational development. Wetness can be reduced by land grading that helps to remove excess water and by tile drains and open ditches.

The land capability classification is IIIw, and the woodland ordination symbol is 10W.

To—Torhunta mucky fine sandy loam. This soil is very poorly drained. It is in broad interstream areas and on stream terraces. This soil is subject to rare flooding. It is ponded during wet periods. The mapped areas are irregular in shape and range from 20 to 500 acres. The slopes range from 0 to 2 percent.

Typically, the upper part of the surface layer is black mucky fine sandy loam about 3 inches thick. The lower part, to a depth of 18 inches, is very dark gray fine sandy loam. The subsoil, to a depth of 36 inches, is dark grayish brown fine sandy loam. The upper part of the substratum is grayish brown, mottled fine sandy

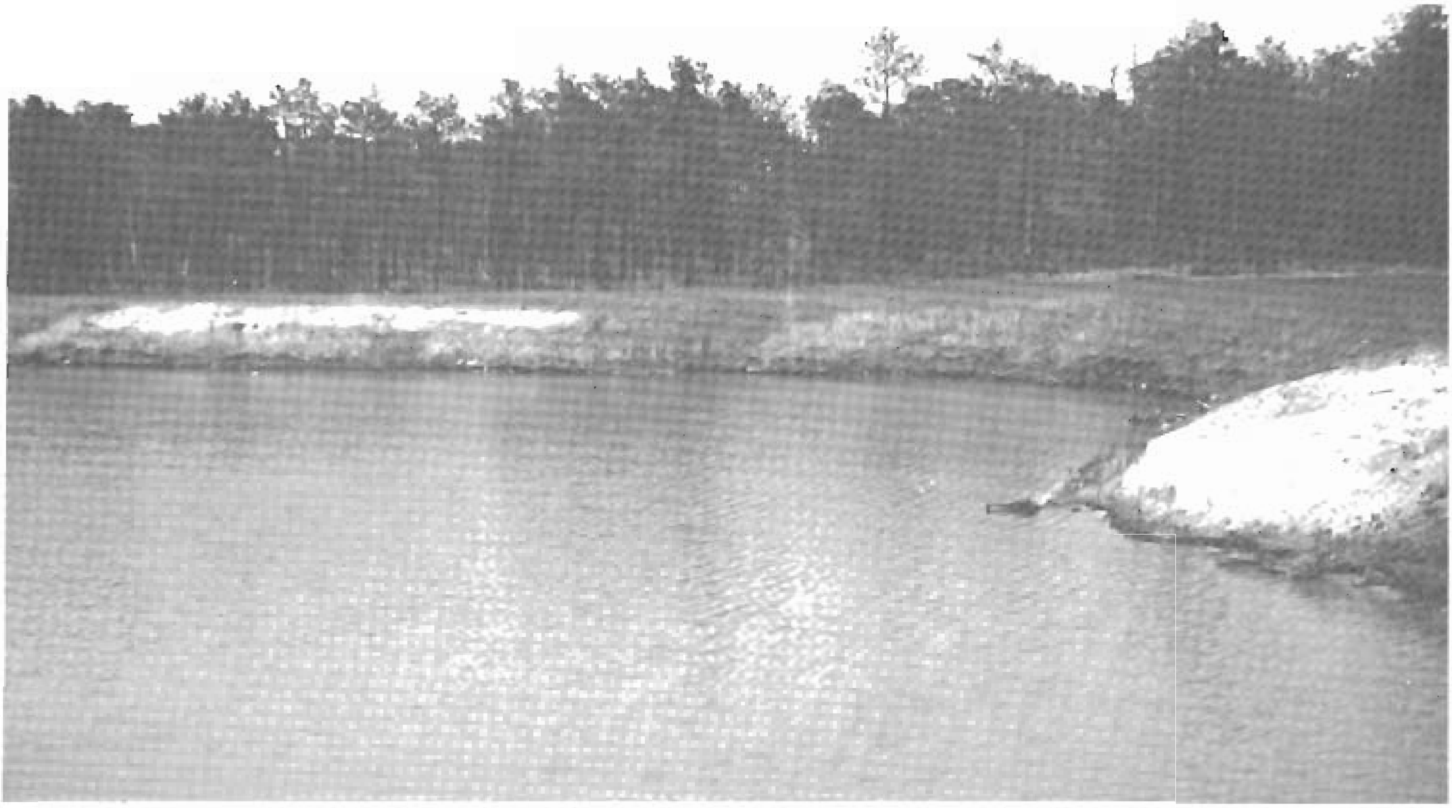


Figure 13.—This pit has filled with ground water and is used for recreation. Ground water ponds in most pits.

loam that has pockets of loamy fine sand and fine sand. The lower part to a depth of 80 inches is light gray, mottled sandy loam that has thin layers of sand. In places, the surface layer is fine sandy loam.

Infiltration is medium, and surface runoff is slow. Permeability is moderately rapid. The available water capacity is moderate. This soil is extremely acid to strongly acid except where lime has been added to the surface layer. The seasonal high water table is 0.5 foot to 1.5 feet below the surface.

Included with this soil in mapping are small intermingled areas of Pantego, Murville, and Croatan soils and small areas of Woodington soils. Pantego, Murville, and Croatan soils are in positions on the landscape similar to those of the Torhunta soil. Pantego soils have more clay in the subsoil than the Torhunta soil. Murville soils have a sandy subsoil and substratum. Croatan soils formed in organic material about 16 to 51 inches thick. Woodington soils are poorly drained and are along the outer edges of the map unit, near shallow drainageways. The included soils make up about 25 percent of this map unit.

This Torhunta soil is used mainly as woodland. In a few small areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, pond pine, sweetgum, water tupelo, yellow poplar, Atlantic white cedar, sycamore, swamp chestnut oak, red maple, willow oak, baldcypress, and water oak. The understory is redbay, sweetbay, southern bayberry, titi, river birch, gallberry, fetterbush lyonia, sweet pepperbush, switchcane, waxmyrtle, blueberry, greenbrier, cinnamon fern, brackenfern, pitcherplant, Venus's-flytrap, sundew, and sphagnum moss. Some large areas have been clearcut, ditched, bedded, fertilized, and planted to loblolly pine. Because of the high content of organic matter in the surface layer, soil strength is low. Logging when the soil is wet creates deep ruts and damages tree roots.

This soil provides fair or good habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, opossum, black bear, and birds. The large wooded areas are used for hunting game animals.

Where this soil is drained and cultivated, the main crops are corn and soybeans. Seasonal wetness is the main limitation. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture during the summer and reduce leaching of plant nutrients.

This soil generally is not used for building site development, sanitary facilities, or recreational development. Seasonal wetness and caving of ditchbanks are the main limitations. Flooding and ponding of surface water are hazards. Even if this soil is drained, wetness is a continuing problem that will affect the use of this soil for most kinds of urban development.

The land capability classification is VIw in undrained areas and IIIw in drained areas. The woodland ordination symbol is 9W.

Wo—Woodington fine sandy loam. This soil is poorly drained. It is in broad, smooth, interstream areas and in depressions near drainageways. In low areas it is subject to ponding for brief periods. The large expanses of this soil, ranging from 200 to 500 acres, are in the broad, smooth, interstream areas. The small areas are irregular in shape and are in shallow depressions on slightly convex divides. These areas range from 5 to 15 acres. The slopes range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sandy loam about 7 inches thick. The upper part of the subsoil is light brownish gray, mottled fine sandy loam. The next part is light gray, mottled fine sandy loam. The lower part to a depth of 60 inches is gray, mottled fine sandy loam that has pockets of loamy fine sand. The substratum to a depth of 80 inches is gray, mottled fine sandy loam that has thin layers of loamy fine sand and sandy clay loam.

Infiltration is medium, and surface runoff is slow. Permeability is moderately rapid. The available water capacity is moderate. This soil is extremely acid to strongly acid except where lime has been added to the surface layer. The seasonal high water table is 0.5 to 1.0 foot below the surface.

Included with this soil in mapping are small intermingled areas of Rains, Grantham, Liddell, and Torhunta soils; some small areas of Foreston soils; and a few intermingled areas of Leon soils. Rains, Grantham, Liddell, and Torhunta soils are in positions on the landscape similar to those of the Woodington soil. Rains soils have more clay in the subsoil than the Woodington soil, and Grantham and Liddell soils have more silt in the subsoil. Torhunta soils are very poorly drained. Foreston soils are moderately well drained and are near drainageways. Leon soils are sandy throughout. Also included are a few intermingled areas of soils having a subsurface layer that has a thin, discontinuous plowpan. The included soils make up about 20 percent of this map unit.

This Woodington soil is used mainly as woodland. In some large areas, it is used as cropland.

Where this soil is used as woodland, the major canopy trees are loblolly pine, longleaf pine, sycamore, red maple, willow oak, sweetgum, swamp chestnut oak, and water oak. The understory is redbay, sweetbay, fetterbush lyonia, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, poison ivy, grape, cinnamon fern, brackenfern, and greenbrier. Some large areas have been clearcut, ditched, bedded, fertilized, and planted to loblolly pine. Logging when the soil is wet causes compaction, creates deep ruts, and damages tree roots.

This soil provides good habitat for wildlife, such as deer, raccoon, fox, rabbit, bobcat, opossum, black bear, and birds. The large wooded areas are used for hunting game animals.

Where this soil is drained and cultivated, the main crops are corn and soybeans. Seasonal wetness and caving of ditchbanks are the main limitations. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. The caving of ditchbanks increases the need for maintenance of open ditches. Conservation tillage, cover crops, and crop residue management will help conserve moisture during the summer and reduce leaching of plant nutrients.

The caving of ditchbanks and seasonal wetness are the main limitations affecting building site development. Seasonal wetness and the seepage of effluent are the main limitations affecting sanitary facilities. Seasonal wetness is the main limitation affecting recreational development. Wetness can be reduced by land grading that helps to remove excess surface water and by tile drains and open ditches. The caving of ditchbanks reduces the capacity of open ditches to remove water and increases the need for maintenance of the ditches.

The land capability classification is IIIw, and the woodland ordination symbol is 8W.

Prime Farmland

In this section, prime farmland is defined and the soils in Pender County that are considered prime farmland are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. The moisture supply must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland, or for other purposes. They are used for food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils usually receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 6 percent.

The following map units, or soils, are considered prime farmland in Pender County. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Some soils that have a high water table qualify as prime farmland only in areas where this limitation has been overcome by drainage measures. If applicable, the need for these measures is indicated in parentheses after the map unit name in the following list. Onsite evaluation is necessary to determine if the limitation has been overcome by the corrective measures.

The soils identified as prime farmland in Pender County are:

AtA	Altavista fine sandy loam, 0 to 3 percent slopes
AyA	Aycock loam, 0 to 3 percent slopes
AyB2	Aycock loam, 3 to 6 percent slopes, eroded
EmA	Exum loam, 0 to 2 percent slopes
Fo	Foreston loamy fine sand
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes
Gr	Grantham loam (where drained)
Gt	Grifton loamy fine sand (where drained)
InA	Invershiel-Pender complex, 0 to 2 percent slopes
Jo	Johns fine sandy loam
KaA	Kalmia loamy fine sand, 0 to 2 percent slopes
NoA	Norfolk loamy fine sand, 0 to 2 percent slopes
NoB	Norfolk loamy fine sand, 2 to 6 percent slopes
On	Onslow loamy fine sand

Pn	Pantego mucky fine sandy loam (where drained)
Ra	Rains fine sandy loam (where drained)
To	Torhunta mucky fine sandy loam (where drained)
Wo	Woodington fine sandy loam (where drained)

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where wetness can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

The basic management practices recommended for the soils in Pender County generally are used by producers. These practices are developing a good crop rotation system, increasing or maintaining the content of organic matter in the soil, applying lime and the proper amount of fertilizer, using proper tillage methods, managing excess surface and subsurface water, and controlling erosion.

The soils in Pender County are mostly acid and are low in natural fertility. These soils require the addition of lime and fertilizer for optimum crop yields. The kinds and amounts of fertilizer and lime needed should be determined from the results of a soil test.

The sandy soils, such as Alpin, Autryville, and Baymeade soils, leach fertilizer readily. If these soils are used for crop production, applications of fertilizer should be divided into several periods so that the plant can utilize the material before leaching occurs. All fertilization programs should be developed for maximum economic returns.

As organic matter decomposes, it provides some plant nutrients, increases the ability of the soil to retain important nutrients and moisture for plant growth, and reduces the leaching of nutrients. Proper management maintains the content of organic matter at a high level, or increases it, where practical, if the organic matter has been depleted.

A conservation cropping system in which crop residue is used in conjunction with grasses and legumes helps to maintain or increase the content of organic matter and soil fertility. Crop residue and green cover crops, if properly utilized, will improve soil tilth. They also will increase the content of organic matter, which can increase the available water capacity, particularly in sandy soils. The conservation cropping system will reduce the hazard of erosion and help to control weeds, insects, and disease.

The soils of Pender County are well suited to the production of warm-season crops. Corn, soybeans, tobacco, and peanuts are the main row crops. Wheat is the major small grain crop, and oats and barley are grown in some areas. Blueberries are grown on hardpan soils, such as Leon and Murville soils. Sweet potatoes are grown in rotation with peanuts and corn or soybeans on some well drained soils. In pastured areas, fescue is grown on the wet, loamy soils, while hybrid bermudagrass is grown on the well drained, sandy soils. A well managed grazing system will include both warm-season and cool-season plants, where possible.

Most of the soils in Pender County can be easily tilled. Exceptions are Bohicket, Carteret, Corolla, and Newhan soils on the Outer Banks. Croatan and Dorovan mucks can be tilled, but they are used as woodland. Muckalee, Chewacla, and Chastain are the dominant soils on the flood plains along the larger streams. These soils are not tilled because of frequent flooding. Bohicket and Carteret soils, which are in the salt marsh areas, cannot be tilled.

Tillage systems that leave crop residue on the surface have been successful in Pender County. The conservation tillage methods have ranged from no-tillage systems to light disking followed by planting. Where a no-tillage system is applied, corn has been more successful on well drained soils than on other soils. The silty and wet soils remain cold longer, and crops do not respond to the same no-tillage methods as those used on the better drained soils in the county. Generally, the silty and loamy soils produce better yields than the sandy soils year after year if conventional planting methods are used. No-tillage planting methods are most easily applied on the Norfolk, Goldsboro, Foreston, Autryville, and Aycock soils. Lumbee, Woodington, Rains, Torhunta, Grantham, Pantego, and Liddell soils will require special techniques if no-tillage planting methods are used.

A drainage system is needed on most of the cropland, pasture and hayland, and woodland in Pender County. Drainage systems will range from simple surface drains to complex water management systems. In Pender County, Rains, Liddell, Torhunta, Pantego, Woodington, and Lumbee soils in nearly level interstream areas are too wet for crop production unless a drainage system is installed. Rains soils can be drained by tile and open ditches. Liddell, Grantham, Woodington, and Lumbee soils are better suited to surface drains and open ditches.

The moderately well drained Goldsboro, Onslow, and Foreston soils require some drainage improvements, depending on the needs of the crop. If tobacco is planted on these soils, surface drainage and tile drainage systems are desirable.

Soil Fertility

The soils in Pender County generally are low in natural fertility. They are naturally acid. Additions of lime and fertilizer are needed for most kinds of crop production.

Liming requirements are a major concern because the acidity level in the soil affects the activity of beneficial bacteria and the availability of many of the nutrient elements. Lime also neutralizes exchangeable aluminum and thus counteracts the adverse effects of high levels of aluminum on many crops. Liming adds calcium (calcitic lime) or calcium and magnesium (dolomitic lime) to the soil.

A soil test is used as a guide to indicate the amount and kind of lime that should be used. In soils that have a sandy surface layer, magnesium and available calcium levels can be low. The desired pH level can differ, depending on the soil properties and the crop.

Nitrogen fertilizer is required for most crops. Generally, it is not required, however, for peanuts or clover, in some rotations of soybeans, or for alfalfa that is established. A dependable soil test is not available for predicting nitrogen requirements. Appropriate rates are described in the section "Yields Per Acre." Because nitrogen can be readily leached from sandy soils, smaller applications of nitrogen may be needed more than once during the growing season on these soils.

Soil tests can indicate the need for phosphorus and potassium fertilizer. These tests are needed because applied phosphorus and potassium tend to build up in the soil.

Chemical Weed Control

Using herbicides for weed control decreases the need for tillage. It is an integral part of modern farming in Pender County. Soil properties, such as content of organic matter and texture of the surface layer, affect the rate of herbicide application. Estimates for these properties were determined for the soils in the county.

Table 15 shows a general range of organic matter content in the surface layer of the soils. The texture of the surface layer is shown in the detailed map unit descriptions and in the USDA texture column in table 14.

In some areas, the content of organic matter is outside the range shown in table 15. The content can be higher in soils that have received high amounts of animal or manmade waste. Soils that have recently been brought into cultivation can have a higher content of organic matter in the surface layer than similar soils that have been cultivated for a long time. Lower levels are common if the surface layer has been partly or completely removed by erosion, land smoothing, or other activities. Current soil tests are needed to measure the content of organic matter before the required herbicide rates are determined. The herbicide label shows specific application rates based on the content of organic matter and texture of the surface layer.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. Nitrogen rates for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds of nitrogen per acre. If the yield potential is only 100 bushels per acre, then rates of 100 to 120 pounds of nitrogen per acre should be used. Application of nitrogen in excess of potential yields generally is not a sound practice. Excess application of fertilizer causes water pollution and is an unnecessary expense. If corn or cotton follow harvested soybeans or peanuts, nitrogen rates can be reduced by 20 to 30 pounds per acre.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w,* or *s,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is droughty.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w.*

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Edwin J. Young, forester, Soil Conservation Service, helped prepare this section.

Forest managers in Pender County are faced with the challenge of producing greater yields from smaller areas of forest land. Meeting this challenge requires an intensity of management and silvicultural practices little expected a few decades ago. Many of the silvicultural techniques resemble those long practiced in agriculture. The techniques include establishing, weeding, and thinning a desirable young stand; propagating more productive species and genetic varieties; planning for short rotations and complete fiber utilization; controlling insects, diseases, and weeds; and improving tree growth by applications of fertilizer and drainage systems. Even though timber crops require decades to grow, the goal of intensive management is similar to the goal of intensive agriculture—to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests make up 459,089 acres in Pender County, or about 82 percent of the land area *(17).* Commercial forest is land that is producing or is capable of producing crops of industrial wood and is not withdrawn from timber production. Loblolly pine is the most important timber species in the county because it grows fast, is adapted to the soil and climate, brings the highest average sale value per acre, and is easy to establish and manage. Foresters encourage landowners to manage for pine instead of hardwoods on sites suited to pine. Quality pines can be produced more rapidly and in greater volume than quality hardwoods. An important preharvest pine management practice is a prescribed burning program for control of hardwood competition, wildlife habitat improvement, protection from wildfire, and more economical reestablishment of pine.

Loblolly pine grows on a wide variety of soils. It grows best on soils that have a coarse-loamy surface layer and a loamy or clayey subsoil. The highest yields are produced in areas of the poorly drained Rains, Woodington, Grantham, Liddell, Grifton, and Meggett soils and the very poorly drained Torhunta and Pantego soils that have been ditched and bedded. Water management practices are needed to protect seedlings from ponded water, control plant competition, and permit conversion of native stands of pond pine to loblolly pine. Many of the other soils in the county produce good crops of pine, although the yield is lower than that on the poorly drained and very poorly drained soils.

Scattered pond pine of noncommercial value grow on the very poorly drained, organic Croatan soils in large pocosins. These areas have potential for conversion to loblolly pine; however, developing adequate drainage, adding phosphate fertilizer, and bedding are costly.

Deep, excessively drained, sandy soils, such as Kureb and Alpin soils, have very low productivity. Leon, Mandarin, and Murville soils also have poor productivity because of a weakly cemented subsoil.

Four commercial forest types have been identified in the county *(17).* They are described in the following paragraphs.

Loblolly pine.—This forest type covers about 247,001 acres and is made up of more than 50 percent loblolly pine. Other species are pond pine, longleaf pine, southern red oak, water oak, swamp chestnut oak, Shumard oak, white oak, willow oak, red maple, sweetgum, blackgum, yellow poplar, and various hickories. The soils range from somewhat excessively drained to very poorly drained. A significant acreage of the pond pine forest type that grows on very poorly drained soils is included in this acreage.

Oak-pine.—This forest type covers about 34,977 acres. Hardwoods make up more than 50 percent of the stand, and pines make up 25 to 50 percent. The hardwood species are the same as those in the loblolly pine forest type. The dominant trees vary, depending on soil drainage. This forest type represents a trend toward hardwood dominance where pine management practices have not been applied. The understory generally consists of hardwood seedlings and saplings and shrubs that are more tolerant of shade than pine. This forest type is mainly on soils that are well drained to very poorly drained.

Oak-gum-maple.—This forest type covers about 143,426 acres and consists of hardwood forests on broad interstream flats, in depressions, and on narrow to broad flood plains. The soils are poorly drained or very poorly drained. The trees in this forest type include water oak, swamp chestnut oak, willow oak, blackgum, sweetgum, red maple, and yellow poplar on the flats and in depressions and swamp tupelo, baldcypress, water tupelo, American elm, red maple, ash, and American hornbeam on the flood plains.

Longleaf pine.—This forest type covers about 33,685 acres and is made up of more than 50 percent longleaf pine and smaller amounts of loblolly pine, scattered red oak, post oak, turkey oak, blackjack oak, sweetgum, and blackgum. This forest type is mainly on sandy soils that are excessively drained to poorly drained.

One of the first steps in intensively managing forest land is to determine the productive capacity of the soil for several trees. The most productive and valued trees are then selected for each parcel of land. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of decisions concerning expenses and profits associated with intensive forest management, land acquisition, or industrial investments.

The productive capacity of forest land depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to water table, affect forest productivity primarily by influencing the available water capacity, aeration, and root development. The net effects of the interaction of these soil properties and site characteristics determine site productivity.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. For each map unit in the survey area suitable for producing timber, the section "Detailed Soil Map Units" presents information about productivity, limitations in harvesting timber, and management concerns in producing timber. The common forest understory plants are also listed. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

The first tree listed for each soil under the column "Common trees" is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

Table 7 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *S* indicates a dry, sandy soil. The letter *A* indicates a soil that has no significant restrictions or limitations affecting forest use and management. If a soil has more than one limitation, the priority is as follows: W and S.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of *moderate* or *severe* indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, or susceptibility of the surface layer to compaction. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if wetness restricts equipment use from 2 to 6 months per year or if special equipment is needed to prevent or minimize soil compaction. The rating is *severe* if wetness restricts equipment use for more than 6 months per year or if special equipment is needed to prevent or minimize soil compaction. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, and rooting depth. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of *moderate* or *severe* indicate that it may be necessary to use larger than usual planting stock or to make special site preparations, such as bedding, furrowing, or installing a surface drainage system. Reinforcement planting is often needed if the risk is *moderate* or *severe*.

The potential productivity of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. From 6 to 10 trees are listed for most map units. Additional trees that commonly occur on the soil may be listed in the detailed soil map unit descriptions. Generally, only two or three tree species dominate.

For the soils that are commonly used for timber production, the yield is predicted in cubic feet and board feet. It is predicted at the point where mean annual increment culminates. The productivity of the soils in this survey is mainly based on loblolly pine *(8)*, longleaf pine *(15)*, shortleaf pine *(8)*, sweetgum *(6)*, southern red oak *(11)*, yellow poplar *(3)*, and water oak *(7)*.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic meters per hectare per year. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. Cubic feet can be converted to board feet by multiplying by a factor of about 5. For example, a productivity class of 8 means that the soil can be expected to produce 114 cubic feet per acre per year at the point where mean annual increment culminates, or about 570 board feet per acre per year.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and will produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees to use for reforestation.

Recreation

In table 8, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm and is not dusty when dry. Strong slopes can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and lespedeza.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and wheatgrass.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry.

Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, and slope. Examples of wetland plants are smartweed, wild millet, saltgrass, cordgrass, rushes, sedges, and canes.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water control structures. Soil properties and features affecting shallow water areas are wetness slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, mourning dove, cottontail rabbit, red fox, and many species of songbirds.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, otter, alligator, water snake, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet, and because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by a very firm dense layer, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. Depth to a high water table and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to a high water table, flooding, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to a weakly cemented pan, the available water capacity in the upper 40 inches, and the content of salts and sodium affect plant growth. Flooding, wetness, slope, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to a weakly cemented pan, and flooding affect absorption of the effluent.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, flooding, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope can cause construction problems.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by depth to a high water table and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential or slopes of 15 to 25 percent. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. These soils may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Acidity and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. In Pender County, several soils are rated as a probable source of sand. All of the soils are rated as an improbable source of gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant-available nutrients as it decomposes.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of organic matter or salts or sodium. Depth to a high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and the salinity of the soil.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by depth to a weakly cemented pan, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts or sodium. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Wetness, slope, and depth to a weakly cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 17.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 17.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area, or from nearby areas, and on field examination.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They influence the soil's adsorption of cations, moisture retention, shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate or high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Some soils in table 16 are assigned to a dual hydrologic group (B/D or A/D). The first letter is for drained areas, and the second letter is for undrained areas.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. November-April, for example, means that flooding can occur during the period November through April. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table—Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 17 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the North Carolina Department of Transportation, Division of Highways, Materials and Tests Unit.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); and Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(14)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid climate, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Paleudults (*Pale*, meaning an old, well developed soil, plus *udult*, the suborder of the Ultisols that occurs in a humid climate.

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aquic* identifies the subgroup that typifies the great group. An example is Aquic Paleudults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, siliceous, thermic Aquic Paleudults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series. The Goldsboro series is an example of a series that is in the fine-loamy, siliceous, thermic Aquic Paleudults family.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of this pedon is described along with the State plane coordinates. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (13)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (14)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alpin Series

The Alpin series consists of excessively drained soils on the uplands and stream terraces. These soils formed in sandy sediment. The slopes range from 1 to 6 percent.

Typical pedon of Alpin fine sand, 1 to 6 percent slopes; about 12.0 miles south of Burgaw on U.S. Highway 117, about 1.1 mile south of Marlboro on U.S. Highway 117 and North Carolina Highway 133, about 200 feet east on a borrow pit access road, about 75 feet south of the road (2,333,800E; 228,500N):

A—0 to 5 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine particles of organic matter; few medium roots; very strongly acid; clear wavy boundary.

E—5 to 42 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; few medium roots; very strongly acid; gradual wavy boundary.

E/B—42 to 75 inches; very pale brown (10YR 8/3) fine sand; single grained; loose; few brownish yellow (10YR 6/6) loamy fine sand lamellae 1/16 to 1/8 inch thick; strongly acid.

The solum is more than 80 inches thick. Reaction is very strongly acid to slightly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 3. The E horizon has hue of 10YR, value of 6 or 7, and chroma of 3 to 8. It is fine sand or sand.

The E part of the E/B horizon has hue of 10YR or 2.5Y, value of 7 or 8, and chroma of 1 to 4. It is fine sand. The B part of the E/B horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 2 to 8. It occurs as loamy fine sand or fine sandy loam lamellae that range from 1/16 to 1/2 inch in thickness.

Altavista Series

The Altavista series consists of moderately well drained soils on the high terraces along the Cape Fear River. These soils formed in loamy sediment. The slopes range from 0 to 3 percent.

Typical pedon of Altavista fine sandy loam, 0 to 3 percent slopes; about 4.4 miles southwest of Still Bluff on secondary road 1104, about 1.9 miles southwest on secondary road 1107, about 3,200 feet southwest of the end of the road (2,244,250E; 227,100N):

A—0 to 5 inches; brown (10YR 4/3) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; strongly acid; clear wavy boundary.

E—5 to 16 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; strongly acid; clear wavy boundary.

Bt1—16 to 26 inches; yellowish brown (10YR 5/8) clay loam; few medium prominent yellowish red (5YR 4/6) mottles; weak fine angular blocky structure; friable, slightly sticky and slightly plastic; few distinct thin clay films on faces of peds; common medium roots; very strongly acid; clear wavy boundary.

Bt2—26 to 40 inches; yellowish brown (10YR 5/6) sandy clay loam; few medium distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few distinct thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

BCg—40 to 50 inches; light gray (10YR 6/1) sandy loam and thin strata of sandy clay loam; common coarse prominent yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable; few small mica flakes; very strongly acid; gradual wavy boundary.

Cg—50 to 72 inches; grayish brown (10YR 5/2) loamy sand and strata of sand; common coarse distinct light yellowish brown (10YR 6/4) mottles; single grained; loose; very strongly acid.

The thickness of the solum ranges from 30 to 60 inches, and depth to the Bt horizon is 14 to 16 inches. Reaction is very strongly acid to medium acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 6. It is loamy sand, sandy loam, or fine sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 4 to 8. Typically, it has few or common mottles in shades of brown or red in the upper part and few or common mottles in shades of gray in the lower part. In some pedons, however, this horizon is not mottled or the mottles in the lower part are in shades of brown or red. The texture is sandy loam, loam, sandy clay loam, or clay loam.

The BCg horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of brown, red, or gray. The texture is sandy clay loam, sandy loam, or loamy sand.

The Cg horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 4. The texture is sand or loamy sand. Mottles are in shades of brown or gray.

Autryville Series

The Autryville series consists of well drained soils near drainageways on convex divides on the uplands. These soils formed in sandy and loamy sediment. The slopes range from 1 to 4 percent.

Typical pedon of Autryville fine sand, 1 to 4 percent slopes; about 5.8 miles south of Burgaw on U.S. Highway 117, about 0.6 mile east of secondary road 1411, about 600 feet north on a farm road, about 100 feet west of the farm road (2,340,350E; 268,400N):

Ap—0 to 9 inches; pale brown (10YR 6/3) fine sand; weak medium granular structure; very friable; few fine roots; very strongly acid; clear wavy boundary.

E—9 to 26 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; few fine roots; strongly acid; clear wavy boundary.

Bt—26 to 36 inches; yellowish brown (10YR 5/8) fine sandy loam; weak fine subangular blocky structure; very friable; sand grains coated and weakly bridged with clay; strongly acid; gradual wavy boundary.

E′—36 to 50 inches; very pale brown (10YR 7/3) fine sand; weak medium granular structure; very friable; very strongly acid; gradual wavy boundary.

B′t1—50 to 66 inches; brownish yellow (10YR 6/6) fine sandy loam and pockets of loamy fine sand; weak fine subangular blocky structure; very friable; strongly acid; gradual wavy boundary.

B′t2—66 to 80 inches; brownish yellow (10YR 6/6) loamy fine sand and pockets of fine sand; common medium distinct light gray (10YR 7/2) mottles; weak fine subangular blocky structure; very friable; strongly acid.

The solum is more than 60 inches thick, and depth to the Bt horizon ranges from 22 to 33 inches. Reaction is very strongly acid or strongly acid except where lime has been added to the surface layer.

The A or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 3. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or 4. It is sand or fine sand.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. The texture is fine sandy loam or sandy clay loam.

The E′ horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 8. The texture is fine sand or sand.

The B′t horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 2 to 8. Mottles are in shades of yellow, red, and gray. The texture is loamy fine sand, fine sandy loam, or sandy clay loam. In some pedons this horizon has lamellae of these textures.

Aycock Series

The Aycock series consists of well drained soils on slightly convex divides near the major drainageways. These soils formed in loamy and clayey sediment. The slopes range from 0 to 6 percent.

Typical pedon of Aycock loam, 0 to 3 percent slopes; about 3.4 miles west of Burgaw on secondary road 1216, about 0.3 mile south on secondary road 1340, about 50 feet west of the road (2,305,400E; 290,900N):

A—0 to 5 inches; grayish brown (10YR 5/2) loam; weak medium granular structure; very friable; many fine and medium roots; medium acid; clear wavy boundary.

E—5 to 10 inches; pale brown (10YR 6/3) loam; weak medium granular structure; very friable; common fine and medium roots; strongly acid; gradual wavy boundary.

Bt1—10 to 24 inches; brownish yellow (10YR 6/8) clay loam; moderate fine angular blocky structure; friable, slightly sticky and slightly plastic; thin clay films on faces of peds; common medium roots; very strongly acid; gradual wavy boundary.

Bt2—24 to 61 inches; yellowish brown (10YR 5/8) clay loam; few fine distinct red (2.5YR 5/8) mottles; moderate fine angular blocky structure; friable, slightly sticky and slightly plastic; few distinct thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

2BC—61 to 72 inches; mottled light gray (10YR 7/1), strong brown (7.5YR 5/8), and red (2.5YR 5/8) clay; weak fine angular blocky structure; firm, sticky and plastic; few distinct thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

3Cg—72 to 80 inches; light gray (10YR 7/1) loam and thin strata of clay loam; common medium distinct light brownish gray (10YR 6/2) and common medium prominent brownish yellow (10YR 6/8) and red (2.5YR 5/8) mottles; massive; friable; very strongly acid.

The solum is more than 60 inches thick. Depth to the Bt horizon generally is 10 to 13 inches but is 3 to 5 inches in eroded areas. Reaction is very strongly acid or strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3 or is mixed and has value of 4 to 6 and chroma of 4 to 8 in eroded areas.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or 4. The texture is loam, silt loam, or very fine sandy loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 to 8. Mottles are below a depth of 30 inches unless the soil is eroded. Typically, the lower part of this horizon is mottled in shades of red, brown, yellow, or gray. In some pedons it has a gray matrix. The texture is dominantly clay loam, but the range includes silty clay loam and loam.

The 2BC horizon has hue of 10YR or 5Y, value of 7 or 8, and chroma of 1 or 2. Mottles have hue of 10YR to 2.5YR, value of 4 to 6, and chroma of 6 to 8. The texture is dominantly loam or clay loam, but the range includes clay and silt loam.

The 3Cg horizon is gray and has mottles in shades of brown, red, or yellow. The texture is stratified sandy loam, loam, clay loam, silty clay loam, or sandy clay loam.

Baymeade Series

The Baymeade series consists of well drained soils on low ridges and convex divides on the uplands near the major drainageways. These soils formed in sandy and loamy sediment. The slopes range from 1 to 4 percent.

Typical pedon of Baymeade fine sand, 1 to 4 percent slopes; about 1.0 mile southwest of Woodside on U.S. Highway 117, about 1.9 miles southeast of secondary road 1563, about 2,400 feet north of the intersection of secondary roads 1563 and 1607 (2,412,400E; 241,400N):

A—0 to 3 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine and medium roots; many uncoated sand grains; very strongly acid; clear wavy boundary.

E—3 to 8 inches; light gray (10YR 7/2) fine sand; single grained; loose; common fine and medium roots; very strongly acid; clear wavy boundary.

E/Bh—8 to 15 inches; very pale brown (10YR 7/4) fine sand (E); single grained; loose; about 15 percent, by volume, few dark brown (7.5YR 3/2) and brown (7.5YR 4/4) weakly cemented concretions ⅛ to ½ inch in diameter (Bh); common medium distinct brown (10YR 5/3) mottles; few fine and medium roots; very strongly acid; clear wavy boundary.

E′—15 to 25 inches; dark yellowish brown (10YR 4/6) fine sand and few medium distinct light gray (10YR 7/2) bodies of uncoated sand grains; single grained; loose; few medium roots; very strongly acid; clear wavy boundary.

Bt1—25 to 34 inches; yellowish brown (10YR 5/8) fine sandy loam; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

Bt2—34 to 42 inches; brownish yellow (10YR 6/8) fine sandy loam; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

BC—42 to 58 inches; brownish yellow (10YR 6/6) fine sandy loam and strata of gray (10YR 6/1) and very pale brown (10YR 8/3) loamy fine sand; weak fine granular structure; loose; very strongly acid; gradual wavy boundary.

C—58 to 80 inches; very pale brown (10YR 7/3) fine sand; few and common distinct brown (10YR 5/3) mottles; single grained; loose; very strongly acid.

The thickness of the solum ranges from 35 to more than 60 inches, and depth to the Bt horizon ranges from 20 to 40 inches. Reaction ranges from very strongly acid to slightly acid except where lime has been added to the surface layer.

The A or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 4 to 8, and chroma of 1 to 6. It is fine sand, sand, or loamy fine sand. The Bh part of the E/Bh horizon makes up 5 to 20 percent of the horizon. It has hue of 5YR to 10YR, value of 3 to 7, and chroma of 2 to 8. The E′ horizon has hue of 10YR, value of 4 to 7, and chroma of 3 to 6.

The Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 4 to 8. Mottles in shades of yellow or brown are at a depth of more than 25 inches in some pedons. The texture is fine sandy loam or sandy clay loam that occurs as lamellae in some pedons.

The BC horizon has hue of 10YR, value of 5 to 7, and chroma of 6 to 8. Some pedons have mottles in shades of brown and gray. The texture is loamy sand, loamy fine sand, sandy loam, or fine sandy loam.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 1 to 6. It is dominantly fine sand but can be stratified with loamy sand or loamy fine sand.

Bohicket Series

The Bohicket series consists of very poorly drained soils in tidal marshes. These soils formed in loamy sediment deposited by freshwater streams. The slopes are 0 to 1 percent.

Typical pedon of Bohicket silty clay loam, frequently flooded; about 1.0 mile southeast of Vista on secondary road 1561, about 50 feet southwest of the road (2,417,700E; 244,900N):

Ag—0 to 12 inches; black (10YR 2/1) silty clay loam and pockets of fine sandy loam; massive; friable, slightly sticky and slightly plastic; many fine roots; flows easily between fingers; moderately alkaline; gradual wavy boundary.

Cg1—12 to 45 inches; very dark grayish brown (10YR 3/2) clay loam and pockets of silt loam and fine sandy loam; massive; firm, slightly sticky and slightly plastic; few fine roots; flows easily between fingers; moderately alkaline; gradual wavy boundary.

Cg2—45 to 65 inches; very dark grayish brown (10YR 3/2) loam and pockets of fine sandy loam; massive; very friable, slightly sticky and slightly plastic; moderately alkaline.

These soils are more than 60 inches thick. They are continuously saturated, mainly with seawater. Reaction usually ranges from slightly acid to moderately alkaline. After air drying for 30 days, however, the soils are extremely acid.

The Ag horizon has hue of 10YR to 5G, value of 2 to 4, and chroma of 1 or 2. The Cg horizon has hue of 10YR, 5Y, or 5GY, value of 3 to 5, and chroma of 2 or less, or it is neutral and has value of 3 to 5. The upper part of this horizon is dominantly clay loam, silty clay loam, or clay. In some pedons, however, it has thin strata or pockets of silt loam, loam, sand, sandy loam, or sandy clay loam. The lower part of the Cg horizon is sand to clay.

Carteret Series

The Carteret series consists of very poorly drained soils in tidal marshes. These soils formed in sandy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Carteret fine sand, frequently flooded; about 1.6 miles northeast of Surf City on North Carolina Highway 210, about 0.2 mile northwest on secondary road 1585, about 200 feet northwest of the end of the road (2,444,850E; 255,400N):

A—0 to 3 inches; dark grayish brown (2.5Y 4/2) fine sand; massive; very friable; many fine roots; moderately alkaline; clear smooth boundary.

Cg1—3 to 12 inches; gray (5Y 5/1) fine sand; single grained; loose; few fine shell fragments; common fine roots; moderately alkaline; clear wavy boundary.

Cg2—12 to 30 inches; greenish gray (5G 5/1) fine sand and pockets of loamy fine sand; single grained; loose; few fine shell fragments; moderately alkaline; gradual wavy boundary.

Cg3—30 to 60 inches; gray (N 5) sand; single grained; loose; few fine shell fragments; moderately alkaline.

These soils are more than 60 inches thick. They have few or common shell fragments. Reaction is medium acid to moderately alkaline.

The A horizon has hue of 10YR, 2.5Y, or 5GY, value of 3 or 4, and chroma of 1 or 2. The Cg horizon has hue of 5Y, 5G, or 5GY, value of 4 or 5, and chroma of 0 or 1, or it is neutral and has value of 4 or 5. It is dominantly loamy sand, fine sand, or sand. In some pedons, however, it has thin, intermittent layers of clay loam or silty clay loam.

Chastain Series

The Chastain series consists of poorly drained soils on flood plains. These soils formed in sandy and loamy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Chastain loam, in an area of Chewacla and Chastain soils, frequently flooded; about 0.75 mile south of Still Bluff on secondary road 1104, about 2.1 miles southeast on secondary road 1103, about 1.5 miles southeast on a private road to Hedden Bluff Landing, about 1.75 miles south on a private road, about 250 feet north of the road (2,276,250E; 228,200N):

A—0 to 10 inches; gray (10YR 6/1) loam; few fine prominent strong brown (7.5YR 5/6) mottles; weak fine granular structure; friable; common medium and fine roots; very strongly acid; gradual wavy boundary.

Bg—10 to 40 inches; gray (5Y 6/1) clay loam; few medium prominent strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; common medium and fine roots; very strongly acid; gradual wavy boundary.

2Cg1—40 to 50 inches; gray (5Y 6/1) loamy sand; single grained; loose; very strongly acid; clear smooth boundary.

2Cg2—50 to 70 inches; grayish brown (10YR 5/2) sand; single grained; loose; very strongly acid.

The thickness of the solum ranges from 40 to more than 72 inches. Reaction is very strongly acid to slightly acid.

Generally, the A horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 1 to 4, or it is neutral and has value of 4 to 6. Value ranges from 3 to 6 if the horizon is less than 6 inches thick.

The Bg horizon has hue of 10YR to 5Y or 5GY, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. Mottles are in shades of yellow, brown, or red. The texture is silty clay loam, clay loam, silty clay, or clay. The particle-size control section has more than 25 percent silt.

The 2Cg horizon has colors similar to those in the B horizon. The texture is sand, fine sand, or loamy sand.

Chewacla Series

The Chewacla series consists of somewhat poorly drained soils on flood plains. These soils formed in loamy and sandy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Chewacla loam, in an area of Chewacla and Chastain soils, frequently flooded; about 5.6 miles southwest of Still Bluff on secondary road 1104, southwest on secondary road 1107 to the end of the road, about 1.3 miles southwest of the end of the road (2,239,100 E; 225,500N):

A—0 to 5 inches; dark grayish brown (10YR 4/1) loam; weak medium granular structure; friable; few fine and medium roots; very strongly acid; clear wavy boundary.

Bw—5 to 20 inches; dark yellowish brown (10YR 4/6) loam; few fine distinct grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; friable; few fine and medium roots; very strongly acid; gradual wavy boundary.

Bg—20 to 45 inches; gray (10YR 5/1) fine sandy loam; few medium distinct dark yellowish brown (10YR 4/4) and many medium faint dark grayish brown (10YR 4/2) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few small mica flakes; very strongly acid; gradual wavy boundary.

BCg—45 to 58 inches; light gray (10YR 6/1) clay loam; few medium distinct dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/4) mottles; massive; friable, slightly sticky and slightly plastic; few small mica flakes; very strongly acid; gradual wavy boundary.

Cg—58 to 72 inches; grayish brown (10YR 5/2) loamy sand and thin layers of loam and sandy loam; single grained; loose; strongly acid.

The thickness of the solum ranges from 35 to more than 60 inches. Few or common fine mica flakes are throughout the soils. Reaction ranges from very strongly acid to slightly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4.

The Bw horizon has hue of 10YR, value of 4 to 7, and chroma of 3 to 8. Gray mottles are within 24 inches of the surface. Few or common black concretions are in some pedons. The texture is sandy clay loam, clay loam, fine sandy loam, loam, or silty clay loam.

The Bg horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. The texture is similar to that of the Bw horizon.

The Cg horizon is similar in color to the Bg horizon. The texture is stratified sand, loamy sand, silt loam, loam, or sandy loam.

Corolla Series

The Corolla series consists of moderately well drained or somewhat poorly drained soils in depressions and nearly level areas on the Outer Banks. These soils formed in sandy eolian and marine sediment. The slopes range from 0 to 6 percent.

Typical pedon of Corolla fine sand, in an area of Newhan-Corolla-Urban land complex, 0 to 30 percent slopes; about 0.9 mile northeast of Surf City on North Carolina Highway 210, about 50 feet northwest of the highway (2,443,000E; 253,100N):

A—0 to 2 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few medium roots; neutral; clear wavy boundary.

C—2 to 20 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; few medium roots; neutral; gradual wavy boundary.

Cg1—20 to 32 inches; light gray (10YR 7/2) fine sand; single grained; loose; neutral; gradual wavy boundary.

Cg2—32 to 60 inches; light gray (10YR 7/1) fine sand; common medium faint light brownish gray (10YR 6/2) and few coarse distinct gray (10YR 5/1) mottles; single grained; loose; neutral; gradual wavy boundary.

Cg3—60 to 70 inches; mottled light gray (10YR 7/1) and light brownish gray (10YR 6/2) sand; single grained; loose; 5 percent small shells and shell fragments; common black grains; neutral.

The A horizon is 2 to 5 inches thick. Reaction ranges from medium acid to mildly alkaline.

The A horizon has hue of 10YR or 2.5Y or is neutral. It has value of 3 to 6 and chroma of 0 to 3. Some pedons have an Ab horizon at a depth of 24 to 72 inches. This horizon is similar in color to the A horizon.

The C horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or 4. The texture is fine sand or sand.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. The number of high-chroma mottles ranges from none to common. Gray mottles or matrix colors are at a depth of 15 to 40 inches. This horizon is fine sand or sand.

Craven Series

The Craven series consists of moderately well drained soils on side slopes on the uplands. These soils formed in loamy and clayey sediment. The slopes range from 6 to 12 percent.

Typical pedon of Craven loam, in an area of Marvyn and Craven soils, 6 to 12 percent slopes; about 3.4 miles west-southwest of Burgaw on secondary road 1120, about 1.1 miles west-northwest on North Carolina Highway 53, about 50 feet south of the highway (2,302,200E; 286,100N):

A—0 to 2 inches; brown (10YR 5/3) loam; moderate medium granular structure; friable; few fine and medium roots; extremely acid; clear wavy boundary.

E—2 to 6 inches; light yellowish brown (10YR 6/4) loam; moderate medium granular structure; friable; few fine and medium roots; extremely acid; clear wavy boundary.

Bt1—6 to 16 inches; brownish yellow (10YR 6/8) clay; moderate fine angular blocky structure; very firm, sticky and plastic; few faint thin clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—16 to 30 inches; reddish yellow (7.5YR 6/8) clay loam; few medium prominent red (2.5YR 4/8) and common fine prominent light gray (10YR 7/1) mottles; moderate fine angular blocky structure; very firm, sticky and plastic; common distinct thin clay films on faces of peds; extremely acid; gradual wavy boundary.

Btg—30 to 43 inches; gray (10YR 6/1) clay loam; common fine prominent red (2.5YR 4/8) and common medium prominent reddish yellow (7.5YR 6/6) mottles; moderate fine angular blocky structure; firm, sticky and plastic; extremely acid; gradual wavy boundary.

BCg—43 to 50 inches; light gray (10YR 7/1) sandy clay loam and thin strata of sandy loam; common medium prominent brownish yellow (10YR 6/6) and common fine prominent red (2.5YR 4/8) mottles; massive; friable; extremely acid; gradual wavy boundary.

Cg—50 to 80 inches; mottled light gray (10YR 7/2), brownish yellow (10YR 6/6), and red (2.5YR 4/8) sandy loam and thin strata of loamy sand and sandy clay loam; massive; friable; extremely acid.

The thickness of the solum ranges from 40 to more than 60 inches, and depth to the Bt horizon ranges from 6 to 14 inches. Reaction ranges from extremely acid to strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 3. The E horizon has hue of 10YR, value of 6 or 7, and chroma of 3 or 4. It is loam, silt loam, or fine sandy loam. Some pedons do not have an E horizon.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. Gray mottles are at a depth of 16 to 30 inches. This horizon is clay loam or clay.

The Btg horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 1 or 2. It is clay loam, loam, or clay.

The BCg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, yellow, or brown. The texture is dominantly clay loam or sandy clay loam, but the horizon has thin strata of sandy loam or loamy sand.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 6. Mottles are in shades of red, brown, or yellow. This horizon is stratified loam, sandy clay loam, sandy loam, loamy sand, clay loam, or clay.

Croatan Series

The Croatan series consists of very poorly drained soils on interstream divides between widely spaced natural drainageways. These soils formed in herbaceous plant residue deposited over sandy to clayey mineral sediment. The slopes range from 0 to 2 percent.

Typical pedon of Croatan muck; about 10.7 miles northeast of Burgaw on North Carolina Highway 53, north about 1.1 miles on a private road, west about 0.3 mile on a private road, north about 1.1 miles on a private road, about 50 feet east of the road (2,309,300E; 339,800N):

Oa1—0 to 6 inches; black (10YR 2/1) muck; about 3 percent fiber, unrubbed, and 1 percent fiber, rubbed; weak fine granular structure; very friable; common fine and medium roots; few clean sand grains; about 25 percent mineral material; extremely acid; gradual wavy boundary.

Oa2—6 to 35 inches; black (10YR 2/1) muck; about 3 percent fiber, unrubbed, and 1 percent fiber, rubbed; massive; very friable; few fine and medium roots; few clean sand grains; about 30 percent mineral material; few medium roots; extremely acid; gradual wavy boundary.

2Ag—35 to 45 inches; dark brown (7.5YR 3/2) fine sandy loam; massive; friable; extremely acid; gradual wavy boundary.

2Cg1—45 to 75 inches; dark grayish brown (10YR 4/2) sandy clay loam; massive; friable, slightly sticky and slightly plastic; extremely acid; gradual wavy boundary.

2Cg2—75 to 80 inches; dark grayish brown (10YR 4/2) fine sandy loam; massive; very friable; extremely acid.

The organic material ranges from 16 to 51 inches in thickness. It is extremely acid except where lime has been added to the surface layer. The underlying mineral horizons are extremely acid to slightly acid. Logs, stumps, and wood fragments make up 0 to 10 percent of the organic layers. Charcoal particles and pockets of ash are in some pedons.

The Oa horizon has hue of 7.5YR to 10YR or is neutral. It has value of 2 or 3 and chroma of 0 to 2. The content of fiber is 3 to 20 percent before rubbing and less than 10 percent fiber after rubbing. This horizon is typically massive under natural wet conditions. When the soils are drained and cultivated, however, a granular or blocky structure develops in all or part of the organic material, depending on the nature and depth of the material and the duration of drainage.

The 2Ag horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3. The texture is sandy loam, fine sandy loam, or loam.

The 2Cg horizon has hue of 5YR to 5Y, value of 2 to 6, and chroma of 1 to 3. The upper part of this horizon is loam, clay loam, or sandy clay loam. The lower part is sand to clay.

Dorovan Series

The Dorovan series consists of very poorly drained soils on low flood plains along freshwater and brackish water streams. These soils formed in plant residue deposited over sandy or loamy mineral sediment. The slopes are less than 1 percent.

Typical pedon of Dorovan muck, frequently flooded; about 3.8 miles east of Rocky Point on North Carolina Highway 210, south about 2.0 miles to the end of secondary road 1518, about 1,600 feet east of the end of the road (2,355,600E; 243,500N):

Oa1—0 to 14 inches; black (10YR 2/1) sapric material (muck); 30 percent fiber, unrubbed, and 10 percent fiber, rubbed; massive; nonsticky; many fine and medium roots; about 40 percent silt and fine sand; extremely acid; gradual wavy boundary.

Oa2—14 to 45 inches; very dark brown (10YR 2/2) sapric material (muck); 20 percent fiber, unrubbed, and 5 percent fiber, rubbed; massive; nonsticky; common fine and medium roots; about 30 percent silt and fine sand; few medium roots; extremely acid; clear smooth boundary.

Oa3—45 to 60 inches; black (10YR 2/1) sapric material (muck); 10 percent fiber, unrubbed, and 5 percent fiber, rubbed; massive; nonsticky; 50 percent mineral material; extremely acid; clear smooth boundary.

Cg—60 to 75 inches; very dark gray (10YR 3/1) loamy sand; massive; very friable; very strongly acid.

The organic material ranges from 51 to more than 80 inches in thickness. It is extremely acid. The underlying mineral horizon, if it occurs, is very strongly acid or strongly acid.

The Oa horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral and has value of 2 or 3. The Cg horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2, or it is neutral and has value of 3 to 5. It is sand, loamy sand, sandy loam, or loam.

Exum Series

The Exum series consists of moderately well drained soils on slightly convex uplands near shallow drainageways. These soils formed in loamy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Exum loam, 0 to 2 percent slopes; about 0.6 mile southwest of Rhyme Crossroad on the secondary road 1336, about 600 feet northwest on secondary road 1351, about 50 feet southwest of the road (2,296,600E; 292,000N):

Ap—0 to 6 inches; grayish brown (10YR 5/2) loam; weak medium granular structure; very friable; few fine and medium roots; slightly acid; abrupt smooth boundary.

E—6 to 9 inches; pale brown (10YR 6/3) loam; weak medium granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

BE—9 to 12 inches; light yellowish brown (10YR 6/4) loam; weak fine subangular blocky structure; very friable; few fine roots; very strongly acid; clear wavy boundary.

Bt1—12 to 23 inches; brownish yellow (10YR 6/6) clay loam; few fine distinct light brown (7.5YR 4/6) mottles; weak fine angular blocky structure; friable, slightly sticky and slightly plastic; few distinct thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt2—23 to 46 inches; brownish yellow (10YR 6/6) clay loam; common medium distinct light brownish gray (10YR 6/2) and few medium prominent red (2.5YR 5/8) mottles; weak fine angular blocky structure; friable, slightly sticky and slightly plastic; few distinct thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—46 to 62 inches; mottled light gray (10YR 7/1), strong brown (7.5YR 5/8), and light yellowish brown (10YR 6/4) clay loam; weak fine angular blocky structure; firm, slightly sticky and slightly plastic; few distinct thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

BCg—62 to 80 inches; light gray (10YR 7/1) clay loam and thin strata of loam; common medium prominent strong brown (7.5YR 5/8) and red (2.5YR 4/8) mottles; massive; firm, slightly sticky and slightly plastic; very strongly acid.

The solum is more than 60 inches thick, and depth to the Bt horizon ranges from 8 to 15 inches. Reaction is very strongly acid or strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or 4. It is loam, silt loam, or very fine sandy loam. Some pedons do not have an E horizon.

The BE horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 8. The texture is very fine sandy loam, loam, or silt loam.

The upper part of the Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 8. Mottles are in shades of red, yellow, or brown. Also, mottles in shades of gray are within 30 inches of the surface. The texture is clay loam or loam. The lower part of the Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, yellow, brown, or gray. The texture is clay loam, loam, or clay.

The BCg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, yellow, or brown. The texture is loam or clay loam. Some pedons do not have a BCg horizon.

Some pedons have a Cg horizon, which has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 6 or 7. This horizon is stratified clay, silty clay, clay loam, loam, sandy clay loam, or sandy loam.

Foreston Series

The Foreston series consists of moderately well drained soils on slightly convex interstream divides near shallow drainageways. These soils formed in sandy and loamy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Foreston loamy fine sand; about 6.4 miles south of Burgaw on U.S. Highway 117, about 600 feet west on secondary road 1433, about 50 feet north of the road (2,335,200E; 261,900N):

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak medium granular structure; very friable; common fine roots; medium acid; abrupt smooth boundary.

E—8 to 13 inches; pale brown (10YR 6/3) loamy fine sand; weak medium granular structure; very friable; few fine roots; strongly acid; clear wavy boundary.

Bt1—13 to 21 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine subangular blocky structure; very friable; strongly acid; gradual wavy boundary.

Bt2—21 to 40 inches; light yellowish brown (10YR 6/4) fine sandy loam; common medium distinct light brownish gray (10YR 6/2) and brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

B/E1—40 to 55 inches; light gray (10YR 7/1) fine sandy loam (B) and pockets of loamy fine sand (E); common coarse prominent brownish yellow (10YR 6/8) and common medium faint grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

B/E2—55 to 66 inches; light gray (10YR 7/1) fine sandy loam (B) and strata of loamy sand and small pockets of clean sand grains (E); common fine prominent brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

Cg—66 to 80 inches; light gray (10YR 7/1) sandy clay loam and strata of sand and sandy loam; massive; very friable; very strongly acid.

The solum is more than 60 inches thick, and depth to the Bt horizon ranges from 8 to 18 inches. Reaction is very strongly acid to medium acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2. The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or 4. It is loamy fine sand or loamy sand.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 6. Mottles in shades of gray are within 30 inches of the surface.

The B/E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of yellow, brown, and red. The texture is dominantly sandy loam or fine sandy loam, but the horizon has pockets or strata of loamy fine sand or loamy sand.

The Cg horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 to 6 and can be mottled. The texture is stratified sand, loamy sand, sandy loam, fine sandy loam, or sandy clay loam.

Goldsboro Series

The Goldsboro series consists of moderately well drained soils on slightly convex interstream divides near shallow drainageways. These soils formed in loamy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Goldsboro fine sandy loam, 0 to 2 percent slopes; about 1.9 miles southwest of Atkinson on North Carolina Highways 53 and 11, about 0.5 mile northwest on secondary road 1100, about 50 feet northeast of the road (2,244,200E; 278,400N):

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; few fine and medium roots; medium acid; abrupt smooth boundary.

E—10 to 14 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak medium granular structure; very friable; few fine roots; medium acid; clear wavy boundary.

Bt1—14 to 24 inches; brownish yellow (10YR 6/8) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint thin clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—24 to 46 inches; brownish yellow (10YR 6/6) sandy clay loam; few medium distinct light gray (10YR 7/2) and few fine distinct strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg—46 to 63 inches; light gray (10YR 7/1) sandy clay loam; common medium prominent brownish yellow (10YR 6/6) and yellowish red (5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Cg—63 to 80 inches; light gray (10YR 7/1) sandy clay loam and thin strata of sandy loam and sandy clay; common medium prominent brownish yellow (10YR 6/6) and few fine prominent yellowish red (5YR 5/8) mottles; massive; friable, slightly sticky and slightly plastic; very strongly acid.

The solum is more than 60 inches thick, and depth to the Bt horizon ranges from 10 to 15 inches. Reaction is very strongly acid or strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or 4. It is loamy sand, sandy loam, or fine sandy loam. Some pedons do not have an E horizon.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 8. Mottles in shades of gray are at a depth of 18 to 30 inches. The texture is sandy loam or sandy clay loam.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Mottles are in shades of brown, red, yellow, or gray. The texture is sandy clay loam or sandy clay.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, yellow, gray, or brown. The texture is loamy sand, sandy loam, loam, sandy clay loam, clay loam, or clay. In some pedons this layer is stratified. Some pedons do not have a Cg horizon.

Grantham Series

The Grantham series consists of poorly drained soils on broad interstream divides and in depressions. These soils formed in loamy and clayey sediment. The slopes range from 0 to 2 percent.

Typical pedon of Grantham loam; about 1.8 miles west of Burgaw on secondary road 1343, about 0.8 mile west-northwest on secondary road 1216, about 1.3 miles north on secondary road 1314, about 25 feet west of the road (2,308,700E; 297,200N):

Ap—0 to 8 inches; dark gray (10YR 4/1) loam; weak medium granular structure; friable; few fine roots; very strongly acid; abrupt smooth boundary.

Eg—8 to 11 inches; light gray (2.5Y 7/2) loam; few fine prominent brownish yellow (10YR 6/6) mottles; weak medium granular structure; friable; few fine roots; strongly acid; clear wavy boundary.

Btg1—11 to 33 inches; light gray (10YR 6/1) clay loam; few medium prominent brownish yellow (10YR 6/8) and few fine prominent red (2.5YR 4/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; very strongly acid; gradual wavy boundary.

Btg2—33 to 62 inches; light gray (10YR 6/1) clay loam; common coarse prominent yellowish red (5YR 5/8), common fine prominent brownish yellow (10YR 5/8), and few medium prominent red (10R 4/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; very strongly acid; gradual wavy boundary.

BCg—62 to 75 inches; light gray (5Y 7/2) clay loam; common medium prominent brownish yellow (10YR 6/6) and few medium prominent red (10R 4/6) mottles; massive; friable, slightly sticky and slightly plastic; very strongly acid.

The solum is more than 60 inches thick, and depth to the Bt horizon ranges from 10 to 20 inches. Reaction is extremely acid to strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The Eg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. It has mottles in shades of brown or yellow. It is very fine sandy loam, loam, or silt loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, brown, or yellow. The texture is dominantly clay loam, but the range includes silty clay loam.

The BCg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, yellow, or brown. The texture is loam, clay loam, or silty clay loam. Some pedons do not have a BCg horizon.

Grifton Series

The Grifton series consists of poorly drained soils on broad interstream divides and in shallow depressions. These soils formed in loamy sediment over marl. The slopes range from 0 to 2 percent.

Typical pedon of Grifton loamy fine sand; about 1.1 miles northwest of Maple Hill on North Carolina Highway 50, about 0.6 mile southwest on North Carolina Highway 53, about 300 feet southeast of the highway (2,385,000E; 335,400N):

Ap—0 to 9 inches; grayish brown (10YR 5/2) loamy fine sand; weak medium granular structure; very friable; common fine roots; slightly acid; clear smooth boundary.

EB—9 to 12 inches; light brownish gray (10YR 6/2) fine sandy loam; few fine distinct brownish yellow (10YR 6/6) mottles; weak medium granular structure; very friable; common fine roots; slightly acid; clear wavy boundary.

Btg1—12 to 30 inches; light gray (10YR 6/1) sandy clay loam; common fine distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; moderately alkaline; gradual wavy boundary.

Btg2—30 to 50 inches; light gray (10YR 6/1) sandy clay loam; few fine distinct strong brown (7.5YR 5/8) and common fine distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; moderately alkaline; gradual wavy boundary.

B/Cg—50 to 72 inches; light gray (5Y 6/1) sandy loam and thin lenses of sandy clay loam and sandy clay; common medium distinct olive yellow (5Y 6/6) and reddish yellow (7.5YR 6/8) and common coarse distinct yellowish brown (10YR 5/8) and faint gray (N 5) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; moderately alkaline; gradual wavy boundary.

2Cg—72 to 80 inches; white (10YR 8/1) sandy loam; massive; loose; 75 percent soft marl with pockets of loamy sediment and a few fragments of hard marl; moderately alkaline.

The thickness of the solum ranges from 45 to more than 60 inches, and depth to the Bt horizon ranges from 8 to 20 inches. The A, E, and Bt horizons are very strongly acid to slightly acid except where lime has been added to the surface layer. The B/Cg and C horizons are medium acid to moderately alkaline.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The EB or E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of yellow or brown. The texture is loamy sand, loamy fine sand, or fine sandy loam. Some pedons do not have an E or EB horizon.

The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of brown, yellow, red, or gray. The texture is sandy loam or sandy clay loam.

The B/Cg horizon has hue of 10YR to 5Y or 5GY, value of 4 to 7, and chroma of 1 or 2. Mottles are in shades of red, brown, yellow, or gray. The texture is loamy sand or sandy loam that has thin lenses of sandy clay loam or sandy clay. Friable to hard marl fragments and iron and manganese concretions are in some pedons. Some pedons do not have a B/Cg horizon.

The 2Cg horizon has hue of 10YR to 5GY, value of 4 to 8, and chroma of 1 or 2, or it is neutral and has value of 4 to 8. The texture ranges from sand to clay.

Invershiel Series

The Invershiel series consists of moderately well drained soils on the uplands near large drainageways. These soils formed in sandy to clayey sediment over marl. The slopes range from 0 to 2 percent.

Typical pedon of Invershiel loamy sand, in an area of Invershiel-Pender complex, 0 to 2 percent slopes; about 2.2 miles east of Rocky Point on North Carolina Highway 210, about 1.1 miles south on secondary road 1518, about 0.9 mile west on secondary road 1517, about 30 feet south of the road (2,345,850E; 245,850N):

Ap—0 to 4 inches; dark yellowish brown (10YR 4/4) loamy sand; weak medium granular structure; very friable; few fine roots; medium acid; abrupt smooth boundary.

E—4 to 8 inches; light gray (10YR 7/2) loamy sand; few medium faint brown (10YR 5/3) mottles; weak medium granular structure; very friable; few fine roots; slightly acid; clear wavy boundary.

Bt1—8 to 15 inches; yellowish brown (10YR 5/6) clay loam; moderate fine angular blocky structure; firm, plastic and sticky; few thin clay films on faces of peds; medium acid; gradual wavy boundary.

Bt2—15 to 23 inches; yellowish brown (10YR 5/4) clay loam; few fine prominent red (2.5YR 4/8) and common medium distinct gray (10YR 6/1) mottles; moderate fine angular blocky structure; firm, plastic and sticky; few thin clay films on faces of peds; medium acid; gradual wavy boundary.

2Btg—23 to 30 inches; mottled gray (N 6), yellowish brown (10YR 5/4), and strong brown (7.5YR 5/6) clay and pockets of marl; massive; very firm, very plastic and very sticky; common fine and medium black concretions; slightly acid; clear wavy boundary.

3C—30 to 65 inches; light gray (10YR 7/2) grainy marl; few medium distinct brownish yellow (10YR 6/6) mottles; massive; soft; many sand grains and black concretions; moderately alkaline.

The thickness of the solum, or the depth to soft marl, ranges from 20 to 40 inches. Depth to the Bt horizon ranges from 5 to 16 inches. Unless lime has been added to the surface layer, reaction ranges from very strongly acid to slightly acid in the A and E horizons. It is strongly acid to mildly alkaline in the Bt horizon and neutral to moderately alkaline in the 2Btg and 3C horizons.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The E horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 3. In some pedons, it has mottles in shades of brown or gray. It is loamy sand, loamy fine sand, sandy loam, or fine sandy loam. Some pedons do not have an E horizon.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. Mottles are in shades of red, brown, yellow, or gray. The mottles in shades of gray are within the upper 10 inches of this horizon. The texture is sandy clay loam, clay loam, sandy clay, or clay.

The 2Btg horizon has hue of 7.5YR to 2.5Y, value of 5 to 8, and chroma of 1 or 2, or it is neutral and has value of 5 to 8. Mottles are in shades of red, yellow, brown, or gray. The texture is sandy clay loam, clay loam, or clay.

The 3C horizon is light colored marl. Some pedons have strata of loamy or clayey sediment and shells.

Johns Series

The Johns series consists of somewhat poorly drained or moderately well drained soils on stream terraces. These soils formed in loamy and sandy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Johns fine sandy loam; about 4.6

miles west-southwest of Burgaw on North Carolina Highway 53, about 25 feet south of the highway (2,298,000E; 287,900N):

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; common fine roots; very strongly acid; abrupt smooth boundary.

E—9 to 14 inches; pale brown (10YR 6/3) fine sandy loam; weak medium granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

EB—14 to 17 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine subangular blocky structure; friable; very strongly acid; clear wavy boundary.

Bt1—17 to 25 inches; yellowish brown (10YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt2—25 to 33 inches; yellowish brown (10YR 5/4) sandy clay loam; few medium distinct yellowish brown (10YR 5/8) and common medium distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

BCg—33 to 37 inches; light brownish gray (10YR 6/2) sandy loam; few coarse prominent yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

2Cg—37 to 60 inches; grayish brown (10YR 5/2) sand and strata of loamy sand; common medium distinct light yellowish brown (10YR 6/4) mottles; single grained; loose; very strongly acid.

The thickness of the solum ranges from 30 to 40 inches, and depth to the Bt horizon ranges from 13 to 19 inches. Reaction is very strongly acid or strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The E and EB horizons have hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or 4. They are loamy sand, sandy loam, or fine sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 4 to 8. Mottles are in shades of brown, yellow, or gray. The texture is sandy clay loam or sandy loam.

The BCg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of brown, yellow, or gray. The texture is dominantly sandy loam or fine sandy loam, but some pedons have thin strata of sandy clay loam.

The 2Cg horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Mottles are in shades of brown, yellow, or gray. The texture is sand or loamy sand.

Kalmia Series

The Kalmia series consists of well drained soils on slightly convex stream terraces. These soils formed in sandy and loamy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Kalmia loamy fine sand, 0 to 2 percent slopes; about 12.1 miles north of Burgaw on U.S. Highway 117, about 0.2 mile east to the end of secondary road 1500, east about 1,000 feet (2,310,700E; 352,600N):

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak medium granular structure; very friable; common fine roots; medium acid; abrupt smooth boundary.

EB—8 to 12 inches; pale brown (10YR 6/3) fine sandy loam; weak fine subangular blocky structure; very friable; common fine roots; strongly acid; abrupt wavy boundary.

Bt—12 to 32 inches; yellowish brown (10YR 5/8) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

BC—32 to 39 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

2C1—39 to 50 inches; light yellowish brown (10YR 6/4) loamy sand; single grained; very friable; very strongly acid; gradual wavy boundary.

2C2—50 to 80 inches; white (10YR 8/1) sand; single grained; loose; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches, and depth to the Bt horizon ranges from 10 to 20 inches. Reaction is very strongly acid or strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. The EB horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or 4. It is loamy fine sand or fine sandy loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 4 to 8. The texture is sandy clay loam or sandy loam.

The BC horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 8. The texture is sandy clay loam or sandy loam. Some pedons are stratified with these textures.

The 2C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 4. The texture is sand or loamy sand.

Kenansville Series

The Kenansville series consists of well drained soils on terraces. These soils formed in sandy and loamy sediment. The slopes range from 0 to 4 percent.

Typical pedon of Kenansville fine sand, 0 to 4 percent slopes; about 12.1 miles north of Burgaw on U.S. Highway 117, about 0.2 mile east to the end of secondary road 1500, northwest about 20 feet (2,310,750E; 353,000N):

Ap—0 to 9 inches; grayish brown (10YR 5/2) fine sand; weak medium granular structure; very friable; few fine roots; slightly acid; abrupt smooth boundary.

E—9 to 24 inches; pale brown (10YR 6/3) fine sand; single grained; loose; few fine roots; strongly acid; gradual wavy boundary.

Bt—24 to 33 inches; yellowish brown (10YR 5/8) fine sandy loam; weak fine subangular blocky structure; very friable; strongly acid; gradual wavy boundary.

BC—33 to 42 inches; brownish yellow (10YR 6/6) loamy fine sand; weak medium granular structure; very friable; strongly acid; gradual wavy boundary.

C1—42 to 60 inches; very pale brown (10YR 7/4) sand; single grained; loose; strongly acid; gradual wavy boundary.

C2—60 to 80 inches; white (10YR 8/2) sand; single grained; loose; strongly acid.

The thickness of the solum ranges from 40 to 60 inches, and depth to the Bt horizon ranges from 20 to 40 inches. Reaction is very strongly acid to medium acid unless lime has been added.

The Ap or A horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 5 to 8, and chroma of 3 or 4. It is sand or fine sand.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 8. The texture is fine sandy loam or sandy clay loam.

The BC horizon has hue of 10YR, value of 6 to 8, and chroma of 1 to 6. The texture is loamy fine sand or sandy loam.

The C horizon has colors similar to those in the BC horizon. The texture is sand or stratified sand and loamy sand.

Kureb Series

The Kureb series consists of excessively drained soils on the uplands. These soils formed in sandy sediment. The slopes range from 2 to 6 percent.

Typical pedon of Kureb fine sand, 2 to 6 percent slopes; about 8.1 miles northeast of Hampstead on U.S. Highway 17, about 500 feet east-southeast on North Carolina Highway 210, about 100 feet southwest of the highway (2,420,000E; 258,900N):

A—0 to 5 inches; light gray (10YR 6/1) fine sand; single grained; loose; common uncoated sand grains; few fine and few coarse roots; slightly acid; clear wavy boundary.

E—5 to 24 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine and coarse roots; neutral; clear irregular boundary.

C/Bh1—24 to 36 inches; brownish yellow (10YR 6/6) fine sand (C); single grained; loose; few thin strata of light gray (10YR 7/1) material; 10 percent, by volume, dark reddish brown (5YR 3/2) weakly cemented Bh material 0.5 inch to 2.0 inches in length; neutral; clear irregular boundary.

C/Bh2—36 to 57 inches; light yellowish brown (10YR 6/4) fine sand (C); single grained; loose; common medium distinct dark reddish brown (5YR 3/2) horizontal bands and mottles; common light gray (10YR 7/1) streaks 0.25 to 1.0 inch wide; few coarse weakly cemented dark reddish brown (5YR 3/2) concretions; few small pockets of uncoated sand grains; neutral; gradual irregular boundary.

C/Bh3—57 to 80 inches; pale brown (10YR 6/3) fine sand (C); common medium distinct dark reddish brown (5YR 3/2) weakly cemented concretions; single grained; loose; neutral.

Depth to the C/Bh horizon ranges from 20 to 50 inches. Reaction ranges from very strongly acid to neutral.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 1 or 2. It is 2 to 5 inches thick.

The E horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. The texture is sand or fine sand.

The C part of the C/Bh horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 8. The Bh part has hue of 5YR to 10YR, value of 3 to 6, and chroma of 2 to 4. The texture of this horizon is sand or fine sand.

Some pedons have a C horizon, which has hue of 10YR, value of 6 to 8, and chroma of 1 to 8. In some pedons mottles are in shades of these colors. The texture is sand or loamy sand.

Leon Series

The Leon series consists of poorly drained soils on broad interstream areas. These soils formed in sandy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Leon fine sand, 0 to 2 percent slopes; about 2.4 miles northeast of Hampstead on U.S. Highway 17, about 1,500 feet northeast of the intersection of U.S. Highway 17 and secondary road 1593 (2,399,500E; 236,500N):

A—0 to 5 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; about 0.33 percent, by volume, uncoated sand grains; common medium and fine roots; extremely acid; clear wavy boundary.

E—5 to 16 inches; light gray (10YR 7/1) fine sand; single grained; loose; very strongly acid; clear wavy boundary.

Bh—16 to 27 inches; very dark gray (5YR 3/1) fine sand; massive; weakly cemented; very strongly acid; gradual wavy boundary.

E'—27 to 40 inches; light gray (10YR 7/2) fine sand; few coarse faint light gray (10YR 7/1) long vertical mottles; common medium prominent black (10YR 2/2) tongues; single grained; loose; very strongly acid; gradual irregular boundary.

B'h1—40 to 73 inches; dark reddish brown (5YR 2.5/2) fine sand; massive; weakly cemented; very strongly acid; gradual wavy boundary.

B'h2—73 to 80 inches; dark reddish brown (5YR 3/4) fine sand; few fine distinct dark reddish brown (5YR 2.5/2) mottles; massive; very friable; very strongly acid.

The thickness of the solum ranges from 36 to more than 60 inches, and depth to the Bh horizon ranges from 10 to 18 inches. Reaction ranges from extremely acid to strongly acid except where lime has been added to the surface layer. The texture is sand or fine sand throughout the profile.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1. The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. The Bh horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3. The E' horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2. The B'h horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3.

Liddell Series

The Liddell series consists of poorly drained soils in broad interstream areas. These soils formed in loamy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Liddell silt loam; about 2.8 miles southwest at Penderlea on secondary road 1332, about 0.5 mile east-northeast on secondary road 1333, about 50 feet north of the road (2,296,000E; 321,700N):

Ap—0 to 8 inches; dark gray (10YR 4/1) silt loam; weak medium granular structure; friable; few fine roots; medium acid; abrupt smooth boundary.

Bg1—8 to 11 inches; light brownish gray (10YR 6/2) silt loam; few fine prominent brownish yellow (10YR 6/8) mottles; weak medium granular structure; very friable; few fine roots; medium acid; clear wavy boundary.

Bg2—11 to 25 inches; gray (10YR 6/1) silt loam; common medium prominent brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; very friable, slightly sticky and slightly plastic; strongly acid; gradual wavy boundary.

Bg3—25 to 50 inches; gray (10YR 6/1) silt loam; common medium prominent brownish yellow (10YR 6/8) and few medium prominent red (2.5YR 4/8) mottles; weak fine subangular blocky structure; very friable, slightly sticky and slightly plastic; very strongly acid; gradual wavy boundary.

Cg1—50 to 65 inches; light gray (10YR 6/1) silt loam and thin layers of silty clay loam; common medium prominent brownish yellow (10YR 6/8) and few medium prominent red (2.5YR 4/8) mottles; massive; very friable, slightly sticky and slightly plastic; very strongly acid; gradual wavy boundary.

Cg2—65 to 80 inches; light gray (10YR 7/1) silt loam and thin strata of silty clay loam; common medium prominent brownish yellow (10YR 6/8) and few medium prominent red (2.5YR 4/8) mottles; massive; very friable; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. Reaction is very strongly acid or strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2.

The Bg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Mottles are in shades of brown or yellow. The texture is very fine sandy loam, silt loam, or loam.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, brown, or yellow. The texture is silt loam, loam, or very fine sandy loam.

Lumbee Series

The Lumbee series consists of poorly drained soils in slight depressions on stream terraces. These soils formed in loamy and sandy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Lumbee fine sandy loam, occasionally flooded; about 4.9 miles west-southwest of Burgaw on North Carolina Highway 53, about 200 feet south of the highway (2,297,600E; 290,000N):

Ap—0 to 7 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; common fine roots; slightly acid; clear wavy boundary.

E—7 to 13 inches; grayish brown (10YR 5/2) fine sandy loam; weak medium granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

Btg1—13 to 22 inches; grayish brown (10YR 5/2) sandy clay loam; common fine distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; few medium roots; very strongly acid; gradual wavy boundary.

Btg2—22 to 35 inches; grayish brown (10YR 5/2) sandy loam and thin strata of sandy clay loam; few fine distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

2Cg1—35 to 48 inches; grayish brown (10YR 5/2) loamy sand and strata of sand; massive; very friable; very strongly acid; gradual wavy boundary.

2Cg2—48 to 60 inches; grayish brown (10YR 5/2) sand; single grained; loose; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches, and depth to the Bt horizon ranges from 12 to 20 inches. Reaction is very strongly acid or strongly acid unless lime has been added.

The Ap or A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. It is fine sandy loam, sandy loam, or loamy sand.

The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, yellow, brown, or gray. The texture is sandy clay loam or sandy loam.

Some pedons have a BCg horizon, which has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, yellow, brown, or gray. The texture is sandy loam or loamy sand.

The 2Cg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. The texture is sand or loamy sand.

Mandarin Series

The Mandarin series consists of somewhat poorly drained soils on broad uplands. These soils formed in sandy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Mandarin fine sand; about 1.9 miles northwest of Surf City on North Carolina Highway 50, about 1.8 miles west on North Carolina Highway 210, about 50 feet north of the highway (2,423,800E; 256,900N):

A—0 to 4 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine and medium roots; many uncoated sand grains; extremely acid; clear wavy boundary.

E—4 to 19 inches; light gray (10YR 7/1) fine sand; single grained; loose; few medium and coarse roots; extremely acid; clear wavy boundary.

Bh—19 to 32 inches; dark reddish brown (5YR 3/2) fine sand; common medium faint dark reddish brown (5YR 3/4) mottles; massive; weakly cemented; few medium roots; sand grains coated with organic matter; very strongly acid; clear wavy boundary.

BC—32 to 40 inches; pale brown (10YR 6/3) fine sand; common medium distinct dark brown (7.5YR 4/3) mottles; massive; weakly cemented; very strongly acid; clear irregular boundary.

Cg1—40 to 65 inches; light gray (10YR 7/2) sand; common medium distinct brownish yellow (10YR 6/6) mottles; single grained; loose; very strongly acid; gradual wavy boundary.

Cg2—65 to 80 inches; light brownish gray (10YR 6/2) sand; single grained; loose; very strongly acid.

The thickness of the solum ranges from 35 to more than 60 inches, and depth to the Bh horizon ranges from 15 to 30 inches. Unless lime has been added, reaction is extremely acid to medium acid in the A, E, and Bh horizons. It is extremely acid to neutral in the BC and Cg horizons.

The A or Ap horizon has hue of 10YR, value of 3 to 6, and chroma of 1, or it is neutral and has value of 3 to 5. The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. It is sand or fine sand.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 4. The texture is sand, fine sand, or loamy fine sand.

Some pedons have an E′ or E″ horizon, which has the same colors and textures as the E horizon. Some pedons have a B′h or B″h horizon, which has the same colors and textures as the Bh horizon.

The BC horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. Mottles are in shades of brown or yellow. The texture is fine sand, loamy fine sand, or sand.

The Cg horizon has hue of 10YR, value of 6 to 8, and chroma of 1 to 3. Mottles are in shades of yellow or brown. The texture is sand, fine sand, or loamy fine sand. Some pedons do not have a Cg horizon.

Marvyn Series

The Marvyn series consists of well drained soils on side slopes on the uplands. These soils formed in sandy and loamy sediment. The slopes range from 6 to 12 percent.

Typical pedon of Marvyn loamy fine sand, in an area of Marvyn and Craven soils, 6 to 12 percent slopes; about 1.9 miles northwest of Atkinson on secondary road 1201, about 1,000 feet southwest of the road (2,244,000E; 290,600N):

A—0 to 5 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak medium granular structure; very friable; many coarse to fine roots; very strongly acid; clear wavy boundary.

E—5 to 12 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak medium granular structure; very friable; many coarse to fine roots; very strongly acid; clear wavy boundary.

Bt1—12 to 20 inches; yellowish brown (10YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; few medium and fine roots; very strongly acid; gradual wavy boundary.

Bt2—20 to 32 inches; yellowish brown (10YR 5/6) sandy clay loam; few medium prominent red (2.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—32 to 45 inches; yellowish brown (10YR 5/6) sandy clay loam; few medium prominent red (2.5YR 4/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

BC—45 to 55 inches; brownish yellow (10YR 6/6) sandy loam; common medium prominent reddish yellow (7.5YR 6/8) and few medium distinct light gray (10YR 7/2) mottles; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

C—55 to 80 inches; pale brown (10YR 6/3), reddish yellow (7.5YR 6/6), and light gray (10YR 7/2) loamy sand and thin strata of sand; single grained; loose; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches, and depth to the Bt horizon ranges from 8 to 18 inches. Reaction is very strongly acid to medium acid except where lime has been added to the surface layer.

The A or Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. It is loamy sand or loamy fine sand.

Some pedons have a BE or EB horizon, which has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. The texture is sandy loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. Mottles are in shades of red, brown, or yellow in the lower part of the horizon. The texture is sandy loam or sandy clay loam.

The BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. Mottles are in shades of yellow, brown, red, or gray. The texture is sandy loam or sandy clay loam. In some pedons this horizon is stratified. Some pedons do not have a BC horizon.

The C horizon is mottled in shades of yellow, brown, red, or gray. This horizon is stratified sand to sandy clay loam.

Meggett Series

The Meggett series consists of poorly drained soils in slight depressions on the uplands. These soils formed in loamy and clayey sediment underlain by sand or marly material. The slopes range from 0 to 2 percent.

Typical pedon of Meggett loam; about 0.8 mile east of Rocky Point on North Carolina Highway 210, about

0.25 mile north on Interstate Highway 40, about 75 feet east of the interstate (2,338,800E; 254,700N):

A—0 to 6 inches; dark grayish brown (10YR 4/2) loam; weak medium granular structure; friable; common fine and medium roots; slightly acid; abrupt wavy boundary.
Btg1—6 to 20 inches; gray (10YR 6/1) clay loam; common fine prominent brownish yellow (10YR 6/8) mottles; weak fine angular blocky structure; friable, sticky and plastic; neutral; clear wavy boundary.
Btg2—20 to 36 inches; gray (10YR 6/1) sandy clay; common medium prominent brownish yellow (10YR 6/8) mottles; weak fine angular blocky structure; firm, very sticky and very plastic; neutral; clear wavy boundary.
Btg3—36 to 57 inches; gray (10YR 6/1) clay; few medium prominent brownish yellow (10YR 6/8) mottles; weak fine angular blocky structure; firm, very sticky and very plastic; neutral; clear wavy boundary.
Cg—57 to 70 inches; dark gray (5Y 4/1) clay; massive; firm, very sticky and very plastic; neutral; clear wavy boundary.
2Cg—70 to 75 inches; gray (5Y 5/1) loamy fine sand; single grained; loose; moderately alkaline.

The thickness of the solum ranges from 40 to 55 inches, and depth to the Btg horizon ranges from 5 to 15 inches. Depth to lithic contact ranges from 40 to more than 60 inches. The A horizon and the upper part of the Btg horizon are very strongly acid to neutral. The lower part of the Btg horizon and the Cg horizon are slightly acid to moderately alkaline.

The A or Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. Some pedons have an E horizon. This horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It is fine sandy loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. Mottles have hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 1 to 8. The texture is clay loam, sandy clay, or clay.

Some pedons have a B/Cg or BCg horizon, which has hue of 10YR to 5Y or 5GY, value of 5 to 8, and chroma of 1. Mottles have hue of 7.5YR to 5GY, value of 3 to 6, and chroma of 1 to 8. The texture is sandy clay loam, sandy clay, or clay. Also, the horizon has pockets of marl.

The Cg and 2Cg horizon are mottled with colors similar to those of the BCg horizon. They are stratified sand to clay and can have soft or hard marl fragments or iron and manganese concretions. Some pedons do not have a Cg horizon or a 2Cg horizon.

Muckalee Series

The Muckalee series consists of poorly drained soils on flood plains. These soils formed in loamy and sandy recent alluvium. The slopes range from 0 to 2 percent.

Typical pedon of Muckalee loam, frequently flooded; about 1.0 mile north-northwest of Willard on secondary road 1309, about 0.6 mile west on secondary road 1308, about 50 feet south of the road (2,302,700E; 347,100N):

A—0 to 12 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable; common fine and medium roots; strongly acid; gradual wavy boundary.
Cg1—12 to 23 inches; dark grayish brown (10YR 4/2) sandy loam; common medium faint very dark grayish brown (10YR 3/2) and grayish brown (10YR 5/2) mottles; massive; very friable; common fine roots; neutral; gradual wavy boundary.
Cg2—23 to 36 inches; dark grayish brown (10YR 4/2) loamy sand and thin strata of sandy loam; few strata of light brownish gray (10YR 6/2) sand 0.25 to 1.0 inch thick; massive; very friable; few fine and medium roots; neutral; gradual wavy boundary.
Cg3—36 to 60 inches; light brownish gray (10YR 6/2) loamy sand and strata of light gray (10YR 7/1) sand; common strata of very dark grayish brown (10YR 3/2) sandy loam 0.25 to 1.0 inch thick; massive; very friable; neutral.

These soils are more than 60 inches thick. Reaction ranges from strongly acid to neutral in the A horizon and from medium acid to moderately alkaline in the Cg horizon.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The Cg horizon has hue of 10YR or 5Y, value of 4 to 7, and chroma of 1 or 2. Mottles have hue of 10YR, value of 3 to 7, and chroma of 1 to 8. The texture is dominantly sand, loamy sand, or sandy loam, but the horizon has strata of fine sand or fine sandy loam or thin layers of sandy clay loam.

Murville Series

The Murville series consists of very poorly drained soils in interstream areas and depressions. These soils formed in a thin mantle of organic material and in the underlying sandy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Murville muck; about 10.7 miles northeast of Burgaw on North Carolina Highway 53, north about 1.1 miles on a private road, west about 3.0 miles on a private road, south about 0.3 mile on a private road, about 50 feet east of the road (2,355,000E; 332,700N):

Oi—4 inches to 0; partly decomposed leaves and twigs.

Oa—0 to 3 inches; black (10YR 2/1) muck; weak medium granular structure; very friable; common medium and fine roots; extremely acid; gradual wavy boundary.

A—3 to 11 inches; black (10YR 2/1) mucky fine sand; weak medium granular structure; very friable; common medium and fine roots; extremely acid; gradual wavy boundary.

Bh—11 to 49 inches; black (5YR 2.5/1) fine sand and thin lenses of clean sand; massive; very friable; few coarse roots; sand grains coated and bridged with organic matter; extremely acid; gradual wavy boundary.

Cg1—49 to 55 inches; grayish brown (10YR 5/2) loamy fine sand; massive; very friable; extremely acid; gradual wavy boundary.

Cg2—55 to 80 inches; mottled grayish brown (10YR 5/2) and light gray (10YR 6/1) fine sand; massive; very friable; extremely acid.

The thickness of the solum ranges from 40 to 60 inches. Reaction ranges from extremely acid to strongly acid except where lime has been added to the surface layer.

The A or Ap horizon has hue of 7.5YR to 10YR or is neutral. It has value of 2 or 3 and chroma of 0 to 2.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. Sand grains are coated with organic matter and are soft and loamy to the touch. The texture is fine sand or sand.

The Cg horizon has hue of 10YR or 5Y, value of 5 to 7, and chroma of 1 to 3. Some pedons have mottles in shades of these colors. The texture is dominantly sand, fine sand, or loamy fine sand, but the horizon can have strata of loamy sand or fine sandy loam.

Newhan Series

The Newhan series consists of excessively drained soils on the Outer Banks. These soils formed in sandy eolian and marine sediment. The slopes range from 2 to 30 percent.

Typical pedon of Newhan fine sand, in an area of Newhan-Corolla complex, 0 to 30 percent slopes; about 6.4 miles southwest of Surf City on North Carolina Highway 50, about 150 feet south of the intersection of Florida Avenue and Ocean Boulevard (2,433,800E; 245,350N):

A—0 to 2 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; neutral; clear wavy boundary.

C1—2 to 16 inches; light gray (10YR 7/2) fine sand; single grained; loose; few fine shell fragments; neutral; gradual wavy boundary.

C2—16 to 24 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; neutral; gradual wavy boundary.

C3—24 to 70 inches; light gray (10YR 7/1) sand; single grained; loose; neutral.

These soils are more than 60 inches thick. Reaction is extremely acid to mildly alkaline. The content of silt plus clay is less than 5 percent. The content of sand-size, calcareous shell fragments ranges from 0 to 25 percent. The soils have few or common grains of dark minerals.

The A horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Some pedons do not have an A horizon. The C horizon has hue of 10YR, value of 7 or 8, and chroma of 1 to 3. It is fine sand or sand.

Norfolk Series

The Norfolk series consists of well drained soils on convex divides near the major drainageways. These soils formed in sandy and loamy sediment. The slopes range from 0 to 6 percent.

Typical pedon of Norfolk loamy fine sand, 0 to 2 percent slopes; about 1.8 miles northwest of Atkinson on secondary road 1201, about 300 feet southwest of the road (2,244,800E; 290,700N):

Ap—0 to 9 inches; grayish brown (10YR 5/2) loamy fine sand; weak medium granular structure; very friable; few fine and medium roots; medium acid; abrupt smooth boundary.

E—9 to 12 inches; very pale brown (10YR 7/4) loamy fine sand; weak medium granular structure; very friable; few fine and medium roots; medium acid; clear wavy boundary.

Bt1—12 to 34 inches; yellowish brown (10YR 5/8) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint thin clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—34 to 50 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct very pale brown (10YR 7/4) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—50 to 61 inches; brownish yellow (10YR 6/6) sandy clay loam; few medium prominent red (2.5YR 4/8) and common medium prominent light gray (10YR 7/1) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; very strongly acid; gradual wavy boundary.

BC—61 to 80 inches; brownish yellow (10YR 6/6) sandy loam and thin strata of sandy clay loam; few medium prominent red (2.5YR 4/8) and common medium distinct light gray (10YR 7/2) mottles; weak fine subangular blocky structure; friable; very strongly acid.

The solum is more than 60 inches thick, and depth to the Bt horizon ranges from 10 to 20 inches. Reaction is very strongly acid or strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3. The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or 4. It is loamy sand or loamy fine sand.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 to 8. In some pedons the lower part of this horizon has mottles in shades of these colors. Also, mottles in shades of gray are at a depth of more than 48 inches. The texture is mainly sandy clay loam but can be sandy loam or clay loam.

The BC horizon has the same range in hue and value as the Bt horizon. Chroma is 1 to 8. Mottles are in shades of red, brown, yellow, or gray. The texture is dominantly sandy loam or sandy clay loam, but the horizon has strata of loamy sand to sandy clay.

Some pedons have a C horizon. This horizon has colors similar to those of the BC horizon and has strata of sandy clay loam, sandy loam, and loamy sand.

Onslow Series

The Onslow series consists of moderately well drained soils on slightly convex uplands. These soils formed in sandy and loamy sediment. The slopes range from 0 to 3 percent.

Typical pedon of Onslow loamy fine sand; about 1.8 miles east of Burgaw on secondary road 1510, about 100 feet east of the end of the road (2,330,700E; 294,800N):

A—0 to 4 inches; gray (10YR 5/1) loamy fine sand; weak medium granular structure; very friable; common fine and medium roots; strongly acid; clear wavy boundary.

E/Bh—4 to 8 inches; brown (10YR 4/3) loamy fine sand; about 15 percent weakly cemented dark reddish brown (5YR 3/2) Bh bodies; massive; very friable; common fine and medium roots; strongly acid; clear wavy boundary.

E—8 to 17 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very friable; common fine and medium roots; very strongly acid; clear wavy boundary.

BE—17 to 20 inches; brownish yellow (10YR 6/6) fine sandy loam; few medium distinct very pale brown (10YR 7/4) mottles; weak fine subangular blocky structure; very friable; sand grains coated and bridged with clay; common fine and medium roots; very strongly acid; gradual wavy boundary.

Bt1—20 to 26 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium prominent strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; few medium roots; very strongly acid; gradual wavy boundary.

Bt2—26 to 40 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium prominent light gray (10YR 6/1) and common fine distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; few medium roots; very strongly acid; gradual wavy boundary.

Btg—40 to 63 inches; gray (10YR 6/1) sandy clay loam; common fine prominent brownish yellow (10YR 6/8) and common medium prominent red (10R 4/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; very strongly acid; gradual wavy boundary.

Cg—63 to 80 inches; gray (10YR 6/1) clay loam and pockets of sandy loam; few fine prominent red (10R 4/8) and common fine prominent brownish yellow (10YR 6/8) mottles; massive; friable; very strongly acid.

The solum is more than 60 inches thick, and depth to the Bt horizon ranges from 10 to 20 inches. Mottles in shades of gray are at a depth of 15 to 25 inches. Reaction ranges from extremely acid to strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The E part of the E/Bh or Bh/E horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. The Bh part has hue of 5YR to 10YR, value of 2 to 5, and chroma of 2 to 4. The Bh part is discontinuous and makes up 10 to 60 percent of the horizon. The content of weakly to strongly cemented Bh concretions ranges from 15 to 25 percent in the Bh part of this horizon. The texture of the E/Bh or Bh/E horizon is fine sandy loam, sandy loam, loamy sand, or loamy fine sand.

The E horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 to 4. The texture is fine sandy loam, sandy loam, loamy sand, or loamy fine sand.

The BE horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 3 to 8, or it has mottles with these colors. The texture is fine sandy loam, sandy loam, or sandy clay loam. Some pedons do not have a BE horizon.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 3 to 8, or it is mottled with these colors. Mottles are in shades of gray, brown, and red in pedons that have a dominant matrix color. The texture is fine sandy loam or sandy clay loam.

The Btg or BCg horizon has hue of 10YR to 5Y, value of 5 to 8, and chroma of 1 or 2. Mottles are in shades of red, brown, and yellow. The texture is sandy clay loam, clay loam, or fine sandy loam.

The Cg horizon is mottled and has a low-chroma matrix. It has strata of sand to clay.

Pactolus Series

The Pactolus series consists of moderately well drained or somewhat poorly drained soils on terraces and uplands. These soils formed in sandy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Pactolus fine sand, 0 to 2 percent slopes; about 4.6 miles northeast of Burgaw on North Carolina Highway 53, about 800 feet north of the intersection of North Carolina Highway 53 and the Northeast Cape Fear River (2,338,300E; 311,400N):

Ap—0 to 10 inches; dark grayish brown (10YR 4/1) fine sand; single grained; loose; common fine roots; few uncoated sand grains; medium acid; clear wavy boundary.

C1—10 to 18 inches; brownish yellow (10YR 6/8) fine sand; single grained; loose; few uncoated sand grains; strongly acid; gradual wavy boundary.

C2—18 to 30 inches; yellow (10YR 7/6) fine sand; few coarse prominent strong brown (7.5YR 5/8) and common medium distinct light gray (10YR 7/2) mottles; single grained; loose; common uncoated sand grains; strongly acid; gradual wavy boundary.

Cg1—30 to 57 inches; light gray (10YR 7/2) fine sand; common medium prominent strong brown (7.5YR 5/8) mottles; single grained; loose; strongly acid; gradual wavy boundary.

Cg2—57 to 80 inches; light brownish gray (2.5Y 6/2) fine sand; single grained; loose; strongly acid.

These soils are more than 60 inches thick. The depth to grayish mottles ranges from 15 to 25 inches. Reaction is very strongly acid or strongly acid except where lime has been added to the surface layer.

The A or Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The C horizon has hue of 10YR, value of 6 or 7, and chroma of 3 or 4. It is fine sand, sand, or loamy fine sand. The Cg horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 to 4, or it has mottles in shades of red, brown, yellow, or gray. Its texture is similar to that of the C horizon.

Pantego Series

The Pantego series consists of very poorly drained soils in broad interstream areas. These soils formed in loamy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Pantego mucky fine sandy loam; about 7.0 miles northeast of Burgaw on North Carolina Highway 53, about 1.7 miles northwest on secondary road 1318, northeast about 0.8 mile on a private road, southeast about 600 feet on a private road, about 50 feet northeast of the road (2,350,000E; 323,000N):

A1—0 to 10 inches; black (10YR 2/1) mucky fine sandy loam; weak medium granular structure; friable; many fine and medium roots; extremely acid; abrupt smooth boundary.

A2—10 to 19 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; extremely acid; gradual wavy boundary.

AB—19 to 24 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine subangular blocky structure; very friable; few medium roots; extremely acid; gradual wavy boundary.

Btg1—24 to 40 inches; dark grayish brown (10YR 4/2) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few medium roots; few faint thin clay films on faces of peds; extremely acid; gradual wavy boundary.

Btg2—40 to 59 inches; gray (10YR 5/1) sandy clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic;

extremely acid; gradual wavy boundary.

Cg1—59 to 72 inches; gray (10YR 5/1) clay loam and thin strata of sandy clay loam; few medium prominent strong brown (7.5YR 5/6) mottles; massive; friable, sticky and plastic; extremely acid; gradual wavy boundary.

Cg2—72 to 80 inches; gray (10YR 6/1) sandy clay loam and thin strata of loamy sand; massive; friable, slightly sticky and slightly plastic; extremely acid.

The thickness of the solum ranges from 50 to more than 60 inches. Reaction ranges from extremely acid to strongly acid except where lime has been added to the surface layer.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2, or it is neutral and has value of 2 or 3. The texture is commonly mucky fine sandy loam in the upper part of this horizon and fine sandy loam in the lower part.

The AB horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2. The texture is loam or fine sandy loam. Some pedons do not have an AB horizon.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2, or it has mottles in shades of brown or yellow. The texture is sandy clay loam or clay loam.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. It is sandy clay loam or clay loam and has thin layers of sandy clay loam, loamy sand, or sand.

Pender Series

The Pender series consists of moderately well drained or somewhat poorly drained soils on the uplands. These soils formed in loamy and sandy sediment underlain by soft marl. The slopes range from 0 to 2 percent.

Typical pedon of Pender fine sandy loam, in an area of Invershiel-Pender complex, 0 to 2 percent slopes; about 2.2 miles east of Rocky Point on North Carolina Highway 210, about 0.2 mile south on secondary road 1518, about 50 feet west of the road (2,345,850E; 245,850N):

Ap—0 to 6 inches; brown (10YR 4/3) fine sandy loam; weak medium granular structure; very friable; few fine roots; slightly acid; abrupt smooth boundary.

E—6 to 13 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak medium granular structure; very friable; few fine roots; strongly acid; clear wavy boundary.

Bt1—13 to 21 inches; brownish yellow (10YR 6/6) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; few fine roots; very strongly acid; gradual wavy boundary.

Bt2—21 to 42 inches; light yellowish brown (10YR 6/4) sandy clay loam; few fine distinct gray (10YR 6/1) and brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

BCg—42 to 54 inches; light gray (10YR 7/1) sandy clay loam and thin strata of sandy loam; few fine distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; slightly acid; clear wavy boundary.

Cg—54 to 58 inches; light gray (10YR 7/1) clay loam and strata of sandy clay loam; few fine distinct pale green (5G 6/2) and common fine distinct brownish yellow (10YR 6/6) mottles; massive; friable; neutral; clear wavy boundary.

2Cg—58 to 75 inches; white (10YR 8/1) soft marl and a few hard marl fragments; massive; very friable; moderately alkaline; strongly effervescent.

The thickness of the solum ranges from 40 to 60 inches, and depth to the Bt horizon ranges from 10 to 20 inches. Unless lime has been added, reaction ranges from very strongly acid to slightly acid in the A horizon. It is medium acid to moderately alkaline in the B horizon. Typically, the pH increases with increasing depth.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 3. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or 4. It is loamy sand, loamy fine sand, or fine sandy loam. Some pedons do not have an E horizon.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 8. Grayish colors are at a depth of more than 20 inches. Mottles in shades of gray, yellow, or brown are in the upper 10 inches of this horizon. The texture is sandy clay loam or loam.

The BCg or Cg horizon has hue of 7.5YR to 2.5Y, value of 5 to 8, and chroma of 1 or 2. Mottles are in shades of red, yellow, white, or brown. The texture is sandy clay loam, sandy loam, clay loam, or clay. In some pedons, the horizon has thin strata of these textures.

The 2Cg horizon is dominanlty marl. In some pedons, however, it has strata of clay loam or sandy loam.

Rains Series

The Rains series consists of poorly drained soils on the uplands. These soils formed in loamy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Rains fine sandy loam; about 1.8 miles northwest of Penderlea on secondary road 1328, about 1.1 miles west on secondary road 1300, about 50 feet northwest of the road (2,271,900E; 336,400N):

A—0 to 4 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; few fine and medium roots; very strongly acid; clear wavy boundary.

E—4 to 8 inches; gray (10YR 6/1) fine sandy loam; weak medium granular structure; very friable; few fine roots; very strongly acid; clear wavy boundary.

EBg—8 to 14 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak medium granular structure; very friable; many pores filled with very dark gray material from the A horizon; very strongly acid; gradual wavy boundary.

Btg1—14 to 42 inches; gray (10YR 6/1) sandy clay loam; common medium prominent brownish yellow (10YR 6/6) and few medium prominent strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—42 to 58 inches; gray (10YR 5/1) sandy clay loam; few medium faint light gray (10YR 7/1) and few coarse prominent brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

BCg—58 to 68 inches; gray (10YR 5/1) sandy clay loam and thin strata of sandy loam; common medium prominent yellow (10YR 7/8), few fine prominent red (10R 4/8), and few coarse faint light gray (10YR 7/1) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; very strongly acid; gradual wavy boundary.

Cg—68 to 80 inches; gray (10YR 5/1) sandy clay loam and thin strata of sandy loam and sandy clay; common coarse prominent brownish yellow (10YR 6/8) and few medium faint light gray (10YR 7/1) mottles; massive; friable, slightly sticky and slightly plastic; very strongly acid.

The solum is more than 60 inches thick, and depth to the Bt horizon ranges from 10 to 20 inches. Reaction is extremely acid to strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It is sandy loam or fine sandy loam.

The EBg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Some pedons do not have an EBg horizon.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. The texture is sandy clay loam or clay loam.

The BCg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1, or it is neutral and has value of 4 to 7. Mottles are in shades of red, brown, yellow, or gray. The texture is sandy clay loam or sandy clay.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1, or it is neutral and has value of 5 to 7. Mottles are in shades of red, brown, yellow, or gray. The texture is sandy loam, sandy clay loam, clay loam, or sandy clay. In some pedons this horizon is stratified with these textures.

Torhunta Series

The Torhunta series consists of very poorly drained soils on broad uplands and stream terraces. These soils formed in loamy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Torhunta mucky fine sandy loam; about 5.5 miles south of Burgaw on U.S. Highway 117, about 0.7 mile west on secondary road 1411, about 0.2 mile south on secondary road 1433, about 300 feet east of the road (2,331,900E; 264,700N):

A1—0 to 3 inches; black (10YR 2/1) mucky fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; very strongly acid; clear wavy boundary.

A2—3 to 18 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; very strongly acid; gradual wavy boundary.

Bg—18 to 36 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium subangular blocky structure; very friable; few medium roots; very strongly acid; gradual wavy boundary.

Cg1—36 to 60 inches; grayish brown (10YR 5/2) fine sandy loam and pockets of loamy fine sand and fine sand; few fine prominent brownish yellow (10YR 6/8) mottles; massive; very friable; very strongly acid; gradual wavy boundary.

Cg2—60 to 80 inches; light gray (10YR 7/1) sandy loam and strata of sand; few fine prominent brownish yellow (10YR 6/8) mottles; massive; very friable; very strongly acid.

The thickness of the solum ranges from 35 to 50 inches. Reaction ranges from extremely acid to strongly acid in the upper part of the profile except where lime has been added to the surface layer. The Cg horizon ranges from extremely acid to slightly acid.

The Ap or A horizon has hue of 10YR or 2.5Y or is neutral. It has value of 2 or 3 and chroma of 0 to 2.

The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2, or it is neutral and has value of 4 to 6. Mottles are in shades of brown or yellow. The texture is fine sandy loam or sandy loam.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 6. The texture is sand, loamy fine sand, or sandy loam. In some pedons the horizon is stratified with these textures.

Woodington Series

The Woodington series consists of poorly drained soils on broad uplands and in depressions. These soils formed in loamy sediment. The slopes range from 0 to 2 percent.

Typical pedon of Woodington fine sandy loam; about 5.5 miles south of Burgaw on U.S. Highway 117, about 1.4 miles west on secondary road 1411, about 50 feet north of the road (2,327,750E; 264,900N):

Ap—0 to 7 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; common fine roots; medium acid; abrupt wavy boundary.

Btg1—7 to 17 inches; light brownish gray (10YR 6/2) fine sandy loam; few fine prominent brownish yellow (10YR 6/8) mottles; weak granular structure; very friable; sand grains coated and bridged with clay; common fine roots; strongly acid; gradual wavy boundary.

Btg2—17 to 37 inches; light gray (10YR 7/1) fine sandy loam and pockets of loamy fine sand; common medium prominent brownish yellow (10YR 6/8) mottles; weak medium granular structure; very friable; sand grains coated and bridged with clay; very strongly acid; gradual wavy boundary.

Btg3—37 to 60 inches; gray (10YR 6/1) fine sandy loam and pockets of loamy fine sand; common medium prominent brownish yellow (10YR 6/8) mottles; weak medium granular structure; very friable; sand grains coated and bridged with clay; very strongly acid; gradual wavy boundary.

Cg1—60 to 72 inches; gray (10YR 6/1) fine sandy loam and strata of loamy fine sand; common fine prominent brownish yellow (10YR 6/8) and common coarse faint light gray (10YR 7/1) mottles; massive; very friable; very strongly acid; gradual wavy boundary.

Cg2—72 to 80 inches; gray (10YR 6/1) fine sandy loam and strata of sandy clay loam; common medium distinct light gray (5Y 7/1) mottles and common fine prominent brownish yellow (10YR 6/8) mottles; massive; very friable; very strongly acid.

The solum is 60 or more inches thick, and depth to the Btg horizon ranges from 8 to 20 inches. Reaction ranges from extremely acid to strongly acid except where lime has been added to the surface layer.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2. Some pedons have an E horizon. This horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. It is fine sandy loam, loamy fine sand, or sandy loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of brown, yellow, and red. The texture is fine sandy loam or sandy loam.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. Mottles are in shades of red, brown, yellow, or gray. The texture is dominantly fine sandy loam, loamy fine sand, or sand, but some pedons have strata of sandy clay loam.

Factors of Soil Formation

Soil is the product of the combined effects of parent material, plants and animals, time, relief, and climate. These five factors determine the characteristics of the soil in any of the natural soil bodies. They achieve their influence by a variety of processes.

The processes of soil formation include additions of organic and mineral material to the soil as solids, liquids, and gasses; losses of these materials from the soil; translocation of materials in the soil; and transformation of mineral and organic substances in the soil *(12)*.

Parent Material

The parent material of most soils in Pender County consists of sediments containing the most stable mineral types, such as quartz. The sediments had little feldspar or other weatherable minerals when deposited. The finest textured sediments are on the surface, and they gradually become coarser with increasing depth. This sedimentary sequence with the highest clay content in the upper part of the surficial formation is significant in the development of these soils. The translocation of the clay from A and E horizons created the finer textured B horizon. The clay distribution in these soils is inherited in part from the original sediment body *(10)*.

The distribution of the kinds of soil reflect the influence of the parent material. The soils that formed in sediment containing equal amounts of sand, silt, and clay or slightly more sand than silt and clay generally have a fine-loamy or coarse-loamy particle-size class. Soils that formed in eolian material are deep and sandy. Soils that formed in sediment containing nearly all silt and very fine sand have a coarse-silty particle-size class. Soils that formed in sediment containing large quantities of shells from marine animals (marl) have high pH values and a calcium and magnesium saturation generally at 60 percent or more. In soils that formed in sediment containing no shells (marl), the pH values in the solum are as much as 5.3, and in most areas aluminum is the dominant cation in this range.

The surface deposits in Pender County are made up of sand and loam of Pleistocene age (10,000 to 1 million years) that increase in thickness toward the coast, except for narrow outcrops of the older underlying beds along the streams. The Pleistocene-age surface sediments are underlain by the Peedee Formation of Cretaceous age (63 to 135 million years) in the western part of the county and by the Castle Hayne Formation of Eocene age (36 to 58 million years) in the eastern part. In a few areas, very thin beds of the Yorktown Formation of Miocene age (13 to 25 million years) are between the Castle Hayne Formation and the surficial sediments *(4)*.

Castle Hayne marl has been mined in the past at various places in a strip several miles long along the Northeast Cape Fear River, from an area near Watha south to below Rocky Point into New Hanover County. Two areas are being actively mined near Maple Hill. The largest pits are east of Rocky Point. In these areas, the Castle Hayne Formation is exposed as low ridges in fields and has very little overburden (0-5 feet). A thin lens of the Trent Formation is above the Castle Hayne Formation west of Rocky Point. Analyses of the marl show slightly more than 89 percent calcium carbonate *(4)*.

The county has three geomorphic surfaces—the Wicomico, Talbot, and Pamlico surfaces.

The *Wicomico surface* is on about 45 percent of Pender County and is in the central and northwest parts of the county. Two smaller areas are in the northeast and southeast parts. The Wicomico surface generally ranges from 45 to 80 feet above sea level; however, a sand ridge west of Atkinson rises to 110 feet.

The *Talbot surface* is on about 40 percent of the county and is in the east-central and south-central parts of the county. It ranges from 25 to 45 feet in elevation.

The *Pamlico surface* is in a narrow strip near the Cape Fear, Black, and Northeast Cape Fear Rivers. It is also on the flood plains along small streams draining into the Intracoastal Waterway. It ranges from sea level to 25 feet in elevation *(9)*.

The Angola Bay and Holly Shelter areas are roughly circular pocosins. They are on about 78,000 acres in the eastern part of the county. These are the widest undissected interstream areas in the county and are level and very poorly drained. They have accumulated a mantle of organic material thick enough to obscure nearly all topographic features of the underlying former mineral surface. The organic material ranges from 6 to 70 inches in thickness and has covered the Carolina Bays and shallow drainageways, which have accumulated the thickest organic layers. In all areas except for the Carolina Bays, the organic layers become progressively thinner toward the drainage streams. Near the main streams, the surface of these interstream areas is composed of mineral material.

Plants and Animals

Plants and animals determine the kinds of organic matter and how it is incorporated into the soil. Pine forests cover most of the dissected uplands in Pender County. The undissected interstream divides are covered mainly with pond pine and shrubs. Cypress, sweetgum, and various hardwoods are predominant on the flood plains at an elevation of about 5 feet. Flood plains below a depth of about 5 feet are covered by grass and scattered cypress.

Roots take up nutrients from the lower and upper horizons, and animals transfer soil particles from one horizon to another. Plants and animals add organic matter, and plant roots aid development of soil structure and porosity. Organic matter is the energy source for micro-organisms involved in oxygen consumption in saturated soils. The biological activity reduces the free oxygen levels of the ground water so that anaerobic conditions can exist for several days or weeks. Prolonged saturation and biological activity cause anaerobic, reducing conditions that result in the gray color in the subsoil and underlying material of the very poorly drained and poorly drained soils.

Time

The development of the sequence of horizons in the soil profiles takes a long time. Relief changes with time. Some of the differences among the soils in Pender County reflect differences in age and changes in relief caused by natural or geologic erosion. Aycock, Autryville, and Goldsboro are old soils on the more stable, nearly level upland divides. They have a well developed, thick B horizon. In contrast, Chastain and Muckalee are young soils characterized by almost no horizon development. Lumbee, Johns, Kalmia, Kenansville, and Marvyn soils have a well developed, relatively thin B horizon and are considered intermediate in age.

Relief

Relief in Pender County is mainly the result of dissection of about two-thirds of the original, nearly level plains by the Cape Fear and Northeast Cape Fear Rivers and their tributaries. The degree of dissection of the landscape affects the formation of soils by influencing the depth of the water table and the geologic removal of soil material by slope retreat. The shape and size of the individual areas on the soil maps reflect the influence of landscape dissection.

Autryville, Norfolk, Aycock, Goldsboro, Exum, Kalmia, Kenansville, Marvyn, Foreston, and Onslow soils are near short, sharply rounded side slopes. They are generally well drained or moderately well drained. These soils generally have a light colored A or Ap horizon, a thick E horizon, and a B horizon of bright color.

Grantham, Grifton, Liddell, Meggett, Pantego, Rains, Torhunta, and Woodington soils are in the smooth, broad, nearly level interstream areas. These soils are generally poorly drained or very poorly drained. They generally have a dark colored A or Ap horizon, a thin E horizon, and a gray or dark grayish brown B horizon.

In the most undissected parts of the large interstream areas, organic material has accumulated. Rainfall in the Angola Bay and Holly Shelter areas exceeds the evapotranspiration rate and the rate of removal of water by slow flow over land to the nearby shallow streams. These factors result in a water table that is at or near the surface for much of the year, which allows the accumulation of organic material. The major soils in these areas are Croatan, Pantego, Torhunta, and Murville soils.

Climate

Pender County has a warm, humid climate. Summers are hot, and winters are mild. Rainfall exceeds evapotranspiration during about 7 months of the year. Climate determines the kinds of plants and animals living in and on the soils. The mild temperatures and the amount and intensity of rainfall favor the rapid decomposition of organic matter, hasten chemical reactions and the leaching of soluble bases, and increase the translocation of the fine particles in the soil profile. As a result, most of the soils in the county, except for those that formed in marl, are acid, strongly leached, and low in natural fertility. The soils generally have a higher content of clay in the B horizon than in the A or C horizon. Exceptions are the soils that formed in sandy material or recent alluvium.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Aquifer. A water-bearing bed or stratum of permeable rock, sand, or gravel capable of yielding considerable quantities of water to wells or springs.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Carolina bay. A shallow, oval depression that lacks a natural drainage outlet. Such bays are oriented in a northwest-southwest direction and range from 5 acres to more than 500 acres. Most have standing water unless they are drained.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels, i.e., clay coating, clay skin.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Geomorphic surface. A part of the surface of the land that has definite geographic boundaries and is formed by one or more agencies during a given timespan.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Interstream divide. The nearly level land between drainageways in relatively undissected parts of Coastal Plain uplands, low marine terraces, and stream terraces where the soils are dominantly poorly drained or very poorly drained.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

No-till planting. A method of planting in which a thin slice of soil is opened as the seed is planted at the desired depth. Seedbed preparation is limited to the creation of such openings.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Pocosin. Waterlogged land in large, flat interstream areas that are elevated above the distant flood plains. Soils are typically high in content of organic matter and vegetated by plants that are highly tolerant of wetness.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are—

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the slope classes are—

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Sloping	6 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 30 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Underlying material. Technically, the C horizon; the part of the soil below an A horizon or a B horizon. It is unaltered or slightly altered soil material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-81 at Willard, North Carolina]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snowfall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	56.2	32.9	44.6	77	11	73	3.87	2.13	5.40	8	0.7
February---	59.4	34.4	46.9	80	14	79	3.68	1.93	5.22	7	1.1
March------	66.4	40.7	53.6	85	21	173	4.05	2.53	5.41	8	.8
April------	76.2	48.7	62.5	91	30	375	2.86	1.62	3.95	5	.0
May--------	82.2	57.2	69.7	95	38	611	4.54	2.34	6.45	8	.0
June-------	87.0	64.1	75.6	98	48	768	5.70	3.08	8.01	7	.0
July-------	89.5	68.0	78.8	98	56	893	7.49	4.50	10.16	10	.0
August-----	88.7	67.5	78.1	98	55	871	6.17	3.74	8.34	9	.0
September--	84.2	62.2	73.2	94	45	696	5.22	2.68	7.44	7	.0
October----	75.4	50.6	63.0	89	28	403	2.66	.94	4.08	5	.0
November---	66.8	41.1	54.0	83	20	151	3.09	1.31	4.59	5	.0
December---	58.5	34.4	46.5	78	13	73	3.29	1.75	4.63	6	.4
Yearly:											
Average--	74.2	50.2	62.2	---	---	---	---	---	---	---	---
Extreme--	---	---	---	99	10	---	---	---	---	---	---
Total----	---	---	---	---	---	5,166	52.62	46.07	60.02	85	3.0

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-81 at Willard, North Carolina]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 22	Apr. 1	Apr. 20
2 years in 10 later than--	Mar. 15	Mar. 28	Apr. 15
5 years in 10 later than--	Mar. 1	Mar. 19	Apr. 4
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 5	Oct. 25	Oct. 17
2 years in 10 earlier than--	Nov. 10	Oct. 31	Oct. 22
5 years in 10 earlier than--	Nov. 21	Nov. 11	Nov. 1

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-81 at Willard, North Carolina]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	240	214	185
8 years in 10	248	221	194
5 years in 10	264	235	211
2 years in 10	281	250	227
1 year in 10	289	257	236

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AnB	Alpin fine sand, 1 to 6 percent slopes	20,235	3.6
AtA	Altavista fine sandy loam, 0 to 3 percent slopes	766	0.1
AuB	Autryville fine sand, 1 to 4 percent slopes	16,729	3.0
AyA	Aycock loam, 0 to 3 percent slopes	1,631	0.3
AyB2	Aycock loam, 3 to 6 percent slopes, eroded	2,441	0.4
BaB	Baymeade fine sand, 1 to 4 percent slopes	11,294	2.0
Bo	Bohicket silty clay loam, frequently flooded	859	0.2
Ca	Carteret fine sand, frequently flooded	6,368	1.1
Ch	Chewacla and Chastain soils, frequently flooded	9,882	1.8
Ct	Croatan muck	60,235	10.7
Do	Dorovan muck, frequently flooded	11,144	2.0
EmA	Exum loam, 0 to 2 percent slopes	10,848	1.9
EuA	Exum-Urban land complex, 0 to 2 percent slopes	1,025	0.2
Fo	Foreston loamy fine sand	22,981	4.1
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes	29,530	5.3
Gr	Grantham loam	11,399	2.0
Gt	Grifton loamy fine sand	8,516	1.5
InA	Invershiel-Pender complex, 0 to 2 percent slopes	1,114	0.2
Jo	Johns fine sandy loam	3,615	0.6
KaA	Kalmia loamy fine sand, 0 to 2 percent slopes	918	0.2
KeB	Kenansville fine sand, 0 to 4 percent slopes	3,100	0.6
KuB	Kureb fine sand, 2 to 6 percent slopes	3,358	0.6
LnA	Leon fine sand, 0 to 2 percent slopes	30,371	5.4
Ls	Liddell silt loam	25,608	4.6
Lu	Lumbee fine sandy loam, occasionally flooded	4,863	0.9
Ma	Mandarin fine sand	5,192	0.9
McC	Marvyn and Craven soils, 6 to 12 percent slopes	6,379	1.1
Me	Meggett loam	2,110	0.4
Mk	Muckalee loam, frequently flooded	30,677	5.5
Mu	Murville muck	63,161	11.3
NhC	Newhan fine sand, dredged, 2 to 10 percent slopes	807	0.1
NkE	Newhan-Corolla complex, 0 to 30 percent slopes	458	0.1
NmE	Newhan-Corolla-Urban land complex, 0 to 30 percent slopes	1,258	0.2
NoA	Norfolk loamy fine sand, 0 to 2 percent slopes	8,458	1.5
NoB	Norfolk loamy fine sand, 2 to 6 percent slopes	13,602	2.4
On	Onslow loamy fine sand	3,990	0.7
PaA	Pactolus fine sand, 0 to 2 percent slopes	19,092	3.4
Pn	Pantego mucky fine sandy loam	5,993	1.1
Pt	Pits	1,314	0.2
Ra	Rains fine sandy loam	47,490	8.4
To	Torhunta mucky fine sandy loam	23,268	4.1
Wo	Woodington fine sandy loam	27,805	4.9
	Water	2,496	0.4
	Total	562,380	100.0

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Corn	Soybeans	Tobacco	Wheat	Peanuts	Sweet potatoes	Improved bermuda-grass	Clover-grass
		Bu	Bu	Lbs	Bu	Lbs	Bu	AUM*	AUM*
AnB------------- Alpin	IVs	60	18	1,500	20	1,800	160	7.0	---
AtA------------- Altavista	IIw	120	45	2,600	55	---	---	9.0	10.5
AuB------------- Autryville	IIs	75	25	2,200	30	2,600	180	9.0	---
AyA------------- Aycock	IIe	120	40	2,700	55	3,000	---	10.0	10.0
AyB2------------ Aycock	IIIe	95	35	2,400	50	2,500	---	9.5	9.5
BaB------------- Baymeade	IIIs	70	25	2,200	30	2,500	170	8.0	---
Bo-------------- Bohicket	VIIIw	---	---	---	---	---	---	---	---
Ca-------------- Carteret	VIIIw	---	---	---	---	---	---	---	---
Ch**:									
Chewacla--------	IVw	80	30	---	---	---	---	---	7.5
Chastain--------	VIw	---	---	---	---	---	---	---	---
Ct***----------- Croatan	IVw	125	40	---	50	---	---	---	8.5
Do-------------- Dorovan	VIIw	---	---	---	---	---	---	---	---
EmA------------- Exum	IIw	125	50	3,000	55	3,000	---	10.0	12.0
Fo-------------- Foreston	IIw	130	35	2,700	55	3,400	---	10.0	12.0
GoA------------- Goldsboro	IIw	135	45	3,000	60	3,600	---	10.0	12.0
Gr***----------- Grantham	IIIw	120	45	---	55	---	---	---	10.0
Gt***----------- Grifton	IIIw	120	40	---	50	---	---	---	10.0
InA------------- Invershiel-Pender	IIIw	130	45	---	50	---	---	---	---
Jo-------------- Johns	IIw	120	45	2,700	50	---	---	10.0	10.5

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Tobacco	Wheat	Peanuts	Sweet potatoes	Improved bermuda-grass	Clover-grass
		Bu	Bu	Lbs	Bu	Lbs	Bu	AUM*	AUM*
KaA------------- Kalmia	I	120	40	2,700	40	2,400	---	9.0	9.5
KeB------------- Kenansville	IIs	70	30	2,000	30	2,400	160	9.0	---
KuB------------- Kureb	VIIs	---	---	---	---	---	---	---	---
LnA**----------- Leon	IVw	50	---	---	---	---	---	---	---
Ls***----------- Liddell	IIIw	140	50	---	50	---	---	---	10.0
Lu***----------- Lumbee	IIIw	125	45	---	50	---	---	---	10.0
Ma**------------ Mandarin	VIs	---	---	---	---	---	---	---	---
McC------------- Marvyn and Craven	VIe	---	---	---	---	---	---	---	---
Me***----------- Meggett	IIIw	100	50	---	---	---	---	---	---
Mk-------------- Muckalee	Vw	---	---	---	---	---	---	---	---
Mu**------------ Murville	Vw	---	---	---	---	---	---	---	---
NhC------------- Newhan	VIIIs	---	---	---	---	---	---	---	---
NkE:									
Newhan----------	VIIIs	---	---	---	---	---	---	---	---
Corolla---------	VIIw	---	---	---	---	---	---	---	---
NoA------------- Norfolk	I	110	40	3,000	60	4,000	---	11.0	9.0
NoB------------- Norfolk	IIe	100	35	2,900	55	3,700	---	11.0	9.0
On-------------- Onslow	IIw	125	40	2,700	55	3,000	---	10.0	10.0
PaA------------- Pactolus	IIIs	70	25	1,800	30	2,200	---	8.0	---
Pn***----------- Pantego	IIIw	135	50	---	50	---	---	---	9.0
Pt. Pits									

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Tobacco	Wheat	Peanuts	Sweet potatoes	Improved bermuda-grass	Clover-grass
		Bu	Bu	Lbs	Bu	Lbs	Bu	AUM*	AUM*
Ra-------------- Rains	IIIw	140	50	2,300	50	---	---	---	9.0
To***----------- Torhunta	IIIw	135	45	---	50	---	---	---	9.0
Wo-------------- Woodington	IIIw	135	35	---	45	---	---	---	9.0

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* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for blueberry yield.

*** Yields shown for this map unit are for drained conditions. See the map unit description for the undrained capability subclass.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	9,376	---	---	---
II	106,792	15,233	71,730	19,829
III	126,689	2,441	93,862	30,386
IV	58,535	---	38,300	20,235
V	93,838	---	93,838	---
VI	77,829	6,379	66,258	5,192
VII	74,943	---	71,585	3,358
VIII	8,286	---	7,227	1,059

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
							Ft^3/ ac/yr	
AnB Alpin	6S	Slight	Moderate	Moderate	Loblolly pine	66	6	Loblolly pine, longleaf pine.
					Longleaf pine	56	4	
					Post oak	---	---	
					Southern red oak	---	---	
					Blackgum	---	---	
					Hickory	---	---	
AtA Altavista	9W	Slight	Moderate	Slight	Loblolly pine	91	9	Loblolly pine, hardwoods*.
					Longleaf pine	84	8	
					Sweetgum	84	6	
					White oak	---	---	
					Red maple	---	---	
					Yellow poplar	---	---	
					Southern red oak	---	---	
					Water oak	---	---	
AuB Autryville	7S	Slight	Moderate	Moderate	Loblolly pine	77	7	Loblolly pine, longleaf pine.
					Longleaf pine	---	---	
					Southern red oak	---	---	
					Hickory	---	---	
					White oak	---	---	
					Post oak	---	---	
					Blackgum	---	---	
AyA, AyB2 Aycock	8A	Slight	Slight	Slight	Loblolly pine	84	8	Loblolly pine.
					Longleaf pine	75	6	
					Southern red oak	80	4	
					White oak	---	---	
					Hickory	---	---	
					Red maple	---	---	
BaB Baymeade	3S	Slight	Moderate	Moderate	Loblolly pine	73	7	Loblolly pine, longleaf pine.
					Longleaf pine	65	5	
					Southern red oak	---	---	
					White oak	---	---	
					Post oak	---	---	
					Blackgum	---	---	
					Hickory	---	---	
Ch: Chewacla	10W	Slight	Moderate	Slight	Loblolly pine	96	10	Loblolly pine, hardwoods*.
					Yellow poplar	100	8	
					American sycamore	---	---	
					Sweetgum	97	9	
					Water oak	86	6	
					Eastern cottonwood	---	---	
					Southern red oak	---	---	
Chastain	8W	Slight	Severe	Severe	Sweetgum	95	8	Hardwoods*.
					Baldcypress	---	---	
					Water tupelo	---	---	
					Water oak	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
							Ft^3/ac/yr	
Ct	4W	Slight	Severe	Severe	Pond pine	55	4	Loblolly pine**.
Croatan					Water tupelo	---	---	
					Baldcypress	---	---	
					Atlantic white-cedar	---	---	
					Yellow poplar	---	---	
Do	5W	Slight	Severe	Severe	Water tupelo	55	5	Baldcypress, hardwoods*.
Dorovan					Sweetbay	---	---	
					Baldcypress	---	---	
					Green ash	---	---	
					Carolina ash	---	---	
EmA	8W	Slight	Moderate	Slight	Loblolly pine	82	8	Loblolly pine, hardwoods*.
Exum					Longleaf pine	77	7	
					Sweetgum	90	7	
					Yellow poplar	100	8	
					Southern red oak	---	---	
					White oak	---	---	
					Red maple	---	---	
Fo	9W	Slight	Moderate	Slight	Loblolly pine	90	9	Loblolly pine.
Foreston					Longleaf pine	75	6	
					Sweetgum	---	---	
					Water oak	---	---	
					Blackgum	---	---	
					Southern red oak	---	---	
					White oak	---	---	
					Yellow poplar	---	---	
GoA	9W	Slight	Moderate	Slight	Loblolly pine	90	9	Loblolly pine, hardwoods*.
Goldsboro					Longleaf pine	77	7	
					Sweetgum	90	7	
					Southern red oak	---	---	
					White oak	---	---	
					Water oak	---	---	
					Red maple	---	---	
Gr	9W	Slight	Severe	Severe	Loblolly pine	86	9	Loblolly pine**, hardwoods*.
Grantham					Sweetgum	---	---	
					Water oak	---	---	
					Red maple	---	---	
					Willow oak	---	---	
					Longleaf pine	---	---	
					Swamp chestnut oak	---	---	
Gt	9W	Slight	Severe	Severe	Loblolly pine	89	9	Loblolly pine**, hardwoods*.
Grifton					Water oak	---	---	
					Willow oak	---	---	
					Red maple	---	---	
					Sweetgum	---	---	
					Longleaf pine	---	---	
					Swamp chestnut oak	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
							Ft^3/ac/yr	
InA:								
Invershiel	10W	Slight	Moderate	Slight	Loblolly pine	95	10	Loblolly pine.
					Red maple	---	---	
					White oak	---	---	
					Sweetgum	---	---	
					Longleaf pine	---	---	
Pender	9W	Slight	Moderate	Slight	Loblolly pine	90	9	Loblolly pine, hardwoods*.
					Longleaf pine	75	6	
					Sweetgum	90	7	
					Red maple	---	---	
					White oak	---	---	
					Red oak	---	---	
					Yellow poplar	---	---	
					Sycamore	---	---	
					Hickory	---	---	
					Water oak	---	---	
Jo: Johns	9W	Slight	Moderate	Slight	Loblolly pine	86	9	Loblolly pine.
					Sweetgum	90	7	
					Red maple	---	---	
					Longleaf pine	---	---	
					Blackgum	---	---	
					Southern red oak	---	---	
					White oak	---	---	
KaA: Kalmia	9A	Slight	Slight	Slight	Loblolly pine	90	9	Loblolly pine, hardwoods*.
					Longleaf pine	---	---	
					Sweetgum	88	7	
					Yellow poplar	96	7	
					Southern red oak	---	---	
					White oak	---	---	
					Red maple	---	---	
KeB: Kenansville	8S	Slight	Moderate	Moderate	Loblolly pine	80	8	Loblolly pine, longleaf pine.
					Longleaf pine	65	5	
					Southern red oak	---	---	
					White oak	---	---	
					Post oak	---	---	
					Blackgum	---	---	
					Hickory	---	---	
KuB: Kureb	3S	Slight	Severe	Severe	Longleaf pine	52	3	Longleaf pine.
					Southern red oak	---	---	
					Live oak	---	---	
					Blackgum	---	---	
					Hickory	---	---	
LnA: Leon	5W	Slight	Moderate	Moderate	Longleaf pine	65	5	Longleaf pine.
					Pond pine	---	---	
					Sweetbay	---	---	
					Redbay	---	---	
					Blackgum	---	---	
					Red maple	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
							Ft^3/ac/yr	
Ls Liddell	9W	Slight	Severe	Severe	Loblolly pine	90	9	Loblolly pine**, hardwoods*.
					Sweetgum	90	7	
					Willow oak	---	---	
					Water oak	---	---	
					Red maple	---	---	
					Longleaf pine	---	---	
					Swamp chestnut oak	---	---	
Lu Lumbee	9W	Slight	Severe	Severe	Loblolly pine	94	9	Loblolly pine.
					Sweetgum	---	---	
					Red maple	---	---	
					Longleaf pine	---	---	
					Willow oak	---	---	
					Swamp chestnut oak	---	---	
Ma Mandarin	4S	Slight	Moderate	Severe	Longleaf pine	60	4	Longleaf pine.
					Turkey oak	---	---	
					Sweetgum	---	---	
					Blackgum	---	---	
					Blackjack oak	---	---	
					Southern red oak	---	---	
McC:								
Marvyn	9A	Slight	Slight	Slight	Loblolly pine	90	9	Loblolly pine.
					Longleaf pine	80	7	
					Hickory	---	---	
					Red oak	---	---	
					White oak	---	---	
Craven	8W	Slight	Moderate	Slight	Loblolly pine	89	8	Loblolly pine.
					Longleaf pine	67	5	
					White oak	---	---	
					Southern red oak	---	---	
					Blackgum	---	---	
					American red cedar	---	---	
					Hickory	---	---	
Me Meggett	9W	Slight	Severe	Severe	Loblolly pine	100	9	Loblolly pine**.
					Water oak	---	---	
					Sweetgum	---	---	
					Willow oak	---	---	
					Red maple	---	---	
Mk Muckalee	7W	Slight	Severe	Severe	Sweetgum	90	7	Hardwoods*.
					Loblolly pine	90	9	
					Water oak	90	---	
					Green ash	---	---	
					Eastern cottonwood	---	---	
					Blackgum	---	---	
					Black tupelo	---	---	
Mu Murville	4W	Slight	Severe	Severe	Sweetgum	---	---	Loblolly pine**.
					Pond pine	50	4	
					Red maple	---	---	
					Atlantic white-cedar	---	---	
					Water tupelo	---	---	
					Yellow poplar	---	---	
					Baldcypress	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
							Ft^3/ac/yr	
NoA, NoB	9A	Slight	Slight	Slight	Loblolly pine	86	9	Loblolly pine.
Norfolk					Longleaf pine	68	5	
					White oak	---	---	
					Red oak	---	---	
					Hickory	---	---	
					Red maple	---	---	
On	7A	Slight	Slight	Slight	Loblolly pine	76	7	Loblolly pine.
Onslow					Longleaf pine	67	5	
					White oak	---	---	
					Sweetgum	---	---	
					Blackgum	---	---	
					Southern red oak	---	---	
PaA	8W	Slight	Moderate	Moderate	Loblolly pine	84	8	Loblolly pine.
Pactolus					Longleaf pine	70	6	
					Willow oak	---	---	
					Southern red oak	---	---	
					Sweetgum	---	---	
					Blackgum	---	---	
					Water oak	---	---	
					Hickory	---	---	
Pn	9W	Slight	Severe	Severe	Loblolly pine	98	9	Loblolly pine**,
Pantego					Willow oak	---	---	hardwoods*.
					Pond pine	73	---	
					Baldcypress	---	---	
					Water tupelo	---	---	
					Water oak	---	---	
					Atlantic white-cedar	---	---	
Ra	10W	Slight	Severe	Severe	Loblolly pine	94	10	Loblolly pine**,
Rains					Willow oak	---	---	hardwoods*.
					Sweetgum	90	7	
					Water oak	---	---	
					Red maple	---	---	
					Longleaf pine	---	---	
					Swamp chestnut oak	---	---	
To	9W	Slight	Severe	Severe	Loblolly pine	90	9	Loblolly pine**,
Torhunta					Red maple	---	---	hardwoods*.
					Sweetgum	90	7	
					Water tupelo	---	---	
					Pond pine	---	---	
					Sycamore	---	---	
					Atlantic white-cedar	---	---	
Wo	8W	Slight	Severe	Severe	Loblolly pine	83	8	Loblolly pine,
Woodington					Sweetgum	---	---	hardwoods*.
					Water oak	---	---	
					Willow oak	---	---	
					Water tupelo	---	---	
					Red maple	---	---	
					Sycamore	---	---	

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* To establish hardwoods on a forested site, rely on natural reproduction (seeds and sprouts) of acceptable species. Special site preparation techniques may be required. Planting of hardwoods on a specific site should be done upon recommendations of a forester.

** Potential productivity is attainable in areas adequately drained, bedded, or both.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AnB Alpin	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
AtA Altavista	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
AuB Autryville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
AyA Aycock	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight	Slight.
AyB2 Aycock	Moderate: percs slowly.	Slight	Moderate: slope.	Slight	Slight.
BaB Baymeade	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Bo Bohicket	Severe: flooding, ponding, percs slowly.	Severe: ponding, excess salt.	Severe: ponding, flooding.	Severe: ponding.	Severe: excess salt, excess sulfur, ponding.
Ca Carteret	Severe: flooding, ponding, too sandy.	Severe: ponding, too sandy, excess salt.	Severe: too sandy, ponding, flooding.	Severe: ponding, too sandy.	Severe: excess salt, ponding, droughty.
Ch:					
Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Chastain	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Ct Croatan	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus, too acid.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: too acid, wetness.
Do Dorovan	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
EmA Exum	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
EuA:					
Exum	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
Urban land.					
Fo Foreston	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Moderate: droughty.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GoA------------------ Goldsboro	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight----------	Slight.
Gr------------------- Grantham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Gt------------------- Grifton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
InA:					
Invershiel-----------	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Pender---------------	Moderate--------	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Jo------------------- Johns	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
KaA------------------ Kalmia	Slight----------	Slight----------	Slight----------	Slight----------	Moderate: droughty.
KeB------------------ Kenansville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
KuB------------------ Kureb	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
LnA------------------ Leon	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Ls------------------- Liddell	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, erodes easily.	Severe: ponding.
Lu------------------- Lumbee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ma------------------- Mandarin	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, droughty.
McC:					
Marvyn---------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Craven---------------	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Me------------------- Meggett	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Mk------------------- Muckalee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Mu Murville	Severe: ponding.	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: ponding.
NhC Newhan	Severe: flooding, slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty, slope.
NkE:					
Newhan	Severe: flooding, slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty, slope.
Corolla	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
NmE:					
Newhan	Severe: flooding, slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty, slope.
Corolla	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Urban land.					
NoA Norfolk	Slight	Slight	Slight	Slight	Slight.
NoB Norfolk	Slight	Slight	Moderate: slope.	Slight	Slight.
On Onslow	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
PaA Pactolus	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
Pn Pantego	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness.
Pt. Pits					
Ra Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
To Torhunta	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Wo Woodington	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AnB Alpin	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
AtA Altavista	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AuB Autryville	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AyA, AyB2 Aycock	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BaB Baymeade	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Bo Bohicket	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Ca Carteret	---	---	---	---	---	Fair	Good	---	---	Fair.
Ch:										
Chewacla	Very poor.	Poor	Poor	Good	Good	Fair	Fair	Poor	Good	Fair.
Chastain	Very poor.	Poor	Poor	Fair	Poor	Good	Good	Poor	Fair	Good.
Ct Croatan	Fair	Good	Good	Good	Good	Poor	Good	Good	Good	Fair.
Do Dorovan	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
EmA Exum	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Fo Foreston	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
GoA Goldsboro	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Gr Grantham	Good	Good	Good	Good	Good	Poor	Good	Good	Good	Fair.
Gt Grifton	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
InA:										
Invershiel	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor.
Pender	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Jo Johns	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
KaA Kalmia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KeB Kenansville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KuB Kureb	Very poor.	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
LnA Leon	Poor	Fair	Good	Poor	Fair	Fair	Poor	Fair	Fair	Poor.
Ls Liddell	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
Lu Lumbee	Fair	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
Ma Mandarin	Very poor.	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
McC: Marvyn	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Craven	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Me Meggett	Good	Good	Good	Fair	Good	Good	Good	Good	Good	Good.
Mk Muckalee	Poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair.
Mu Murville	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
NhC Newhan	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
NkE: Newhan	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Corolla	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
NoA, NoB Norfolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
On Onslow	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
PaA Pactolus	Fair	Fair	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pn Pantego	Fair	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Pt. Pits										
Ra----------------- Rains	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
To----------------- Torhunta	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Fair.
Wo----------------- Woodington	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AnB Alpin	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
AtA Altavista	Severe: wetness, cutbanks cave.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Moderate: wetness.
AuB Autryville	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty, too sandy.
AyA Aycock	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.	Slight.
AyB2 Aycock	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: low strength.	Slight.
BaB Baymeade	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
Bo Bohicket	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: excess salt, excess sulfur, ponding.
Ca Carteret	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: excess salt, ponding, droughty.
Ch: Chewacla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Chastain	Severe: wetness, cutbanks cave.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Ct Croatan	Severe: excess humus, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: wetness.	Severe: too acid, wetness.
Do Dorovan	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.	Severe: ponding, flooding, excess humus.
EmA Exum	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Slight.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
EuA: Exum	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Slight.
Urban land.						
Fo Foreston	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty.
GoA Goldsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.
Gr Grantham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
Gt Grifton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
InA: Invershiel	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
Pender	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Jo Johns	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Moderate: wetness.
KaA Kalmia	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
KeB Kenansville	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
KuB Kureb	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.
LnA Leon	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Ls Liddell	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Lu Lumbee	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
Ma Mandarin	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
McC:						
Marvyn	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Craven	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
Me Meggett	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, wetness.	Severe: wetness.
Mk Muckalee	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Mu Murville	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
NhC Newhan	Severe: cutbanks cave, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: slope.	Severe: droughty, slope.
NkE:						
Newhan	Severe: cutbanks cave, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: slope.	Severe: droughty, slope.
Corolla	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: flooding, wetness.	Severe: droughty.
NmE:						
Newhan	Severe: cutbanks cave, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: slope.	Severe: droughty, slope.
Corolla	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: flooding, wetness.	Severe: droughty.
Urban land.						
NoA Norfolk	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Slight.
NoB Norfolk	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Slight.
On Onslow	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
PaA Pactolus	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty, too sandy.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Pn--------------- Pantego	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
Pt. Pits						
Ra--------------- Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
To--------------- Torhunta	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
Wo--------------- Woodington	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AnB---------------- Alpin	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
AtA---------------- Altavista	Severe: wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: wetness.
AuB---------------- Autryville	Moderate: wetness.	Severe: seepage.	Severe: wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
AyA---------------- Aycock	Severe: percs slowly.	Moderate: seepage, wetness.	Moderate: too clayey.	Slight----------	Fair: too clayey.
AyB2--------------- Aycock	Severe: percs slowly.	Moderate: seepage, slope, wetness.	Moderate: too clayey.	Slight----------	Fair: too clayey.
BaB---------------- Baymeade	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: too sandy.
Bo----------------- Bohicket	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
Ca----------------- Carteret	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, ponding.
Ch:					
Chewacla----------	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Chastain----------	Severe: flooding, wetness, percs slowly.	Severe: flooding, seepage.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness.	Poor: wetness, too clayey, hard to pack.
Ct----------------- Croatan	Severe: wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: wetness, too acid.	Severe: seepage, wetness.	Poor: wetness, thin layer.
Do----------------- Dorovan	Severe: flooding, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: ponding, excess humus.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EmA----------------- Exum	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
EuA:					
Exum---------------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
Urban land.					
Fo------------------ Foreston	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: thin layer.
GoA----------------- Goldsboro	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Gr------------------ Grantham	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
Gt------------------ Grifton	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
InA:					
Invershiel---------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Pender-------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness, thin layer.
Jo------------------ Johns	Severe: wetness.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
KaA----------------- Kalmia	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Good.
KeB----------------- Kenansville	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Fair: too sandy.
KuB----------------- Kureb	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
LnA----------------- Leon	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Ls------------------ Liddell	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Lu----------------- Lumbee	Severe: wetness, flooding.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, flooding.	Severe: seepage, wetness, flooding.	Poor: wetness.
Ma----------------- Mandarin	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: wetness, seepage.	Poor: seepage, too sandy.
McC:					
Marvyn-------------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: hard to pack, slope.
Craven-------------	Severe: wetness, percs slowly.	Severe: slope.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
Me----------------- Meggett	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Mk----------------- Muckalee	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Mu----------------- Murville	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
NhC---------------- Newhan	Severe: poor filter, slope.	Severe: seepage, flooding, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
NkE:					
Newhan-------------	Severe: poor filter, slope.	Severe: seepage, flooding, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Corolla------------	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: wetness, seepage.	Severe: seepage, wetness.	Poor: seepage, too sandy.
NmE:					
Newhan-------------	Severe: poor filter, slope.	Severe: seepage, flooding, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Corolla------------	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: wetness, seepage.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Urban land.					

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
NoA, NoB Norfolk	Moderate: wetness.	Moderate: seepage.	Severe: wetness.	Slight	Good.
On Onslow	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: wetness.
PaA Pactolus	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, seepage.
Pn Pantego	Severe: wetness.	Severe: seepage, flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Pt. Pits					
Ra Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
To Torhunta	Severe: wetness.	Severe: wetness, seepage, flooding.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
Wo Woodington	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
AnB------------------- Alpin	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: too sandy.
AtA------------------- Altavista	Fair: wetness, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Good.
AuB------------------- Autryville	Good-----------------	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
AyA, AyB2------------- Aycock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
BaB------------------- Baymeade	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: too sandy.
Bo-------------------- Bohicket	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness, too clayey.
Ca-------------------- Carteret	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, excess salt, wetness.
Ch:				
Chewacla-------------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Chastain-------------	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too clayey, wetness.
Ct-------------------- Croatan	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness, too acid.
Do-------------------- Dorovan	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: excess humus, wetness.
EmA------------------- Exum	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
EuA:				
Exum-----------------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Urban land.				
Fo-------------------- Foreston	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
GoA: Goldsboro	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Gr: Grantham	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Gt: Grifton	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
InA:				
Invershiel	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Pender	Fair: thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Jo: Johns	Fair: wetness.	Probable	Improbable: too sandy.	Fair: thin layer.
KaA: Kalmia	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
KeB: Kenansville	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
KuB: Kureb	Good	Probable	Improbable: too sandy.	Poor: too sandy.
LnA: Leon	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Ls: Liddell	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Lu: Lumbee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
Ma: Mandarin	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
McC:				
Marvyn	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones, thin layer.
Craven	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Me: Meggett	Poor: wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Mk: Muckalee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Mu Murville	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
NhC Newhan	Fair: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
NkE:				
Newhan	Fair: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
Corolla	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
NmE:				
Newhan	Fair: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
Corolla	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
NoA, NoB Norfolk	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
On Onslow	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
PaA Pactolus	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Pn Pantego	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Pt. Pits				
Ra Rains	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
To Torhunta	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
Wo Woodington	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
AnB Alpin	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, soil blowing.	Droughty.
AtA Altavista	Moderate: seepage.	Moderate: wetness.	Moderate: deep to water.	Favorable	Wetness	Favorable.
AuB Autryville	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake.	Droughty.
AyA Aycock	Moderate: seepage.	Moderate: piping.	Severe: slow refill.	Deep to water	Erodes easily	Erodes easily.
AyB2 Aycock	Moderate: seepage.	Moderate: piping.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Erodes easily.
BaB Baymeade	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, rooting depth.	Droughty, rooting depth.
Bo Bohicket	Slight	Severe: hard to pack, ponding, excess salt.	Severe: slow refill, salty water.	Ponding, percs slowly, flooding.	Ponding	Wetness, excess salt.
Ca Carteret	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: salty water, cutbanks cave.	Ponding, flooding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, excess salt, droughty.
Ch:						
Chewacla	Moderate: seepage.	Severe: piping, hard to pack, wetness.	Moderate: slow refill.	Flooding	Wetness, flooding.	Wetness.
Chastain	Moderate: seepage.	Severe: hard to pack, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Ct Croatan	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, subsides.	Wetness, percs slowly.	Wetness, percs slowly.
Do Dorovan	Moderate: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, flooding, subsides.	Ponding, flooding.	Wetness.
EmA Exum	Slight	Moderate: piping, wetness.	Moderate: slow refill.	Favorable	Wetness, erodes easily.	Erodes easily.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
EuA:						
Exum	Slight	Moderate: piping, wetness.	Moderate: slow refill.	Favorable	Wetness, erodes easily.	Erodes easily.
Urban land.						
Fo Foreston	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Favorable	Wetness, droughty, fast intake.	Droughty.
GoA Goldsboro	Moderate: seepage.	Moderate: piping, wetness.	Moderate: slow refill.	Favorable	Wetness	Favorable.
Gr Grantham	Slight	Severe: wetness.	Moderate: slow refill.	Favorable	Wetness, erodes easily.	Wetness, erodes easily.
Gt Grifton	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Favorable	Wetness, fast intake.	Wetness.
InA:						
Invershiel	Slight	Severe: thin layer, hard to pack.	Severe: no water.	Percs slowly	Wetness, fast intake, percs slowly.	Wetness, percs slowly.
Pender	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness	Favorable.
Jo Johns	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness	Favorable.
KaA Kalmia	Severe: seepage.	Moderate: seepage.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake.	Droughty.
KeB Kenansville	Severe: seepage.	Moderate: seepage.	Severe: cutbanks cave.	Deep to water	Fast intake, droughty.	Droughty.
KuB Kureb	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Droughty.
LnA Leon	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
Ls Liddell	Moderate: seepage.	Severe: piping, ponding.	Moderate: slow refill.	Ponding	Ponding, erodes easily.	Wetness, erodes easily.
Lu Lumbee	Severe: seepage.	Severe: wetness.	Slight	Cutbanks cave, flooding.	Wetness, flooding.	Wetness.
Ma Mandarin	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
McC:						
Marvyn	Severe: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Fast intake, slope.	Slope.
Craven	Severe: slope.	Severe: hard to pack.	Severe: slow refill, cutbanks cave.	Percs slowly, slope.	Wetness, percs slowly, slope.	Slope, percs slowly.
Me--Meggett	Moderate: seepage.	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
Mk--Muckalee	Moderate: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, flooding.	Wetness, droughty.
Mu--Murville	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
NhC--Newhan	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Slope, droughty.
NkE:						
Newhan	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Slope, droughty.
Corolla	Severe: seepage.	Severe: seepage, wetness, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
NmE:						
Newhan	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Slope, droughty.
Corolla	Severe: seepage.	Severe: seepage, wetness, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
Urban land.						
NoA--Norfolk	Moderate: seepage.	Moderate: piping.	Moderate: deep to water.	Deep to water	Fast intake	Favorable.
NoB--Norfolk	Moderate: seepage, slope.	Moderate: piping.	Moderate: deep to water.	Deep to water	Slope	Favorable.
On--Onslow	Moderate: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Favorable	Wetness, fast intake.	Favorable.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
PaA------------ Pactolus	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
Pn------------- Pantego	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Favorable------	Wetness--------	Wetness.
Pt. Pits						
Ra------------- Rains	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable------	Wetness--------	Wetness.
To------------- Torhunta	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Favorable------	Wetness--------	Wetness.
Wo------------- Woodington	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness--------	Wetness.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications and USDA textures in addition to those shown. In general, the dominant classification and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AnB-------------- Alpin	0-5	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	95-100	90-100	60-100	5-20	---	NP
	5-42	Fine sand, sand.	SP-SM	A-3, A-2-4	0	95-100	90-100	60-100	5-20	---	NP
	42-75	Fine sand, sand.	SP-SM, SM	A-2-4	0	95-100	90-100	60-100	11-20	---	NP
AtA-------------- Altavista	0-16	Fine sandy loam--	ML, CL-ML, SM, SM-SC	A-4, A-2	0	95-100	90-100	65-99	35-60	<23	NP-7
	16-40	Clay loam, sandy clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-7	0	95-100	95-100	60-99	45-75	20-45	5-28
	40-72	Loamy sand, sand.	SM, SP-SM	A-2, A-3	0	100	100	50-75	5-15	---	NP
AuB-------------- Autryville	0-26	Fine sand--------	SP-SM, SM	A-2, A-3	0	100	100	50-100	5-20	---	NP
	26-36	Sandy loam, sandy clay loam, fine sandy loam.	SM	A-2	0	100	100	50-100	15-30	<25	NP-3
	36-50	Sand, fine sand.	SP-SM, SM	A-2, A-3	0	100	100	50-100	5-20	---	NP
	50-80	Sandy clay loam, fine sandy loam, loamy fine sand.	SM, SC, SM-SC	A-2, A-4	0	100	100	60-100	20-49	<30	NP-10
AyA-------------- Aycock	0-10	Loam-------------	ML, CL-ML, CL	A-4	0	100	95-100	80-100	51-80	<25	NP-10
	10-61	Clay loam, silty clay loam, loam.	CL	A-4, A-6, A-7	0	100	95-100	90-100	60-90	2-49	8-30
	61-80	Variable---------	---	---	---	---	---	---	---	---	---
AyB2------------- Aycock	0-4	Loam-------------	ML, CL-ML, CL	A-4	0	100	95-100	80-100	51-80	<25	NP-10
	4-60	Clay loam, silty clay loam, loam.	CL	A-4, A-6, A-7	0	100	95-100	90-100	60-90	22-49	8-30
	60-80	Variable---------	---	---	---	---	---	---	---	---	---
BaB-------------- Baymeade	0-25	Fine sand--------	SM, SP-SM	A-2, A-3	0	100	100	51-100	5-20	---	NP
	25-58	Fine sandy loam, sandy clay loam, sandy loam.	SC, SM, SM-SC	A-2, A-4	0	100	100	60-90	30-49	<25	NP-10
	58-80	Loamy fine sand, sand, loamy sand.	SM, SP-SM	A-2, A-3	0	100	100	51-75	5-30	---	NP
Bo--------------- Bohicket	0-12	Silty clay loam--	CH, MH	A-7	0	100	99-100	90-100	80-100	60-100	15-60
	12-45	Clay, silty clay loam, clay loam.	CH, MH	A-7	0	100	99-100	80-100	70-95	50-100	16-60
	45-65	Variable---------	---	---	---	---	---	---	---	---	---
Ca--------------- Carteret	0-60	Fine sand--------	SP, SP-SM	A-3	0-3	95-100	90-100	60-90	4-10	---	NP

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ch: Chewacla--------	0-5	Loam-------------	ML, CL, CL-ML	A-4, A-6, A-7	0	98-100	95-100	70-100	55-90	25-49	4-20
	5-45	Sandy clay loam, loam, fine sandy loam.	SM, SM-SC, ML, CL	A-4, A-6, A-7-6	0	96-100	95-100	60-100	36-71	20-45	NP-15
	45-58	Silt loam, clay loam, silty clay loam.	ML, MH, CL	A-4, A-6, A-7	0	75-100	65-100	60-100	51-98	32-61	4-28
	58-72	Variable---------	---	---	---	---	---	---	---	---	---
Chastain--------	0-10	Loam-------------	ML, CL, CL-ML	A-4, A-6, A-7	0	100	100	90-100	70-95	23-45	3-18
	10-40	Silty clay loam, clay loam, clay.	CL, CH, ML, MH	A-6, A-7	0	100	100	95-100	85-98	35-75	12-40
	40-70	Loamy sand, sand, fine sand.	SP, SM, SP-SM	A-2, A-3	0	90-100	85-100	51-90	4-25	---	NP
Ct-------------- Croatan	0-35	Muck-------------	PT	---	---	---	---	---	---	---	---
	35-45	Sandy loam, fine sandy loam, mucky sandy loam.	SM, SC, SM-SC	A-2, A-4	0	100	100	60-85	25-49	<30	NP-10
	45-75	Loam, clay loam, sandy clay loam.	CL, SM, ML, SC	A-4, A-6	0	100	100	75-100	36-95	<36	NP-15
	75-80	Variable---------	---	---	---	---	---	---	---	---	---
Do-------------- Dorovan	0-14	Muck-------------	PT	---	0	---	---	---	---	---	---
	14-60	Muck-------------	PT	---	0	---	---	---	---	---	---
	60-75	Sand, loamy sand, loam.	SP-SM, SM-SC, SM	A-1, A-3, A-4, A-2-4	0	100	100	5-70	5-49	<20	NP-7
EmA------------- Exum	0-12	Loam-------------	ML, CL-ML, CL	A-4	0	100	95-100	80-100	51-80	<25	NP-10
	12-80	Loam, clay loam, silty clay loam.	CL	A-4, A-6, A-7	0	100	95-100	90-100	60-90	22-49	8-30
EuA: Exum------------	0-12	Loam-------------	ML, CL-ML, CL	A-4	0	100	95-100	80-100	51-80	<25	NP-10
	12-80	Loam, clay loam, silty clay loam.	CL	A-4, A-6, A-7	0	100	95-100	90-100	60-90	22-49	8-30
Urban land.											
Fo-------------- Foreston	0-13	Loamy fine sand--	SM	A-2	0	100	100	60-100	15-30	---	NP
	13-66	Sandy loam, fine sandy loam.	SM	A-2	0	100	100	70-100	18-35	<25	NP-4
	66-80	Sandy loam, sandy clay loam.	SC, SM-SC, SM	A-2, A-4, A-6, A-7	0	100	100	55-90	25-49	<45	NP-25
GoA------------- Goldsboro	0-14	Fine sandy loam--	SM, SM-SC, SC	A-2, A-4, A-6	0	95-100	95-100	50-100	15-45	<25	NP-14
	14-46	Sandy clay loam, sandy loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0	98-100	95-100	60-100	25-55	16-37	4-18
	46-63	Sandy clay loam, clay loam, sandy clay.	SC, CL, CL-ML, CH	A-4, A-6, A-7-6	0	95-100	90-100	65-95	36-70	25-55	6-32
	63-80	Variable---------	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Gr--------------- Grantham	0-11	Loam-------------	ML, CL-ML	A-4	0	100	100	85-100	55-85	<30	NP-7
	11-75	Loam, clay loam, silty clay loam.	CL	A-4, A-6, A-7	0	100	100	90-100	60-95	22-49	8-30
Gt--------------- Grifton	0-9	Loamy fine sand--	SM, SP-SM	A-2	0	100	95-100	60-100	12-39	<25	NP-4
	9-50	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	98-100	95-100	60-100	31-60	20-35	8-15
	50-72	Loamy sand, sandy loam.	SM, SM-SC	A-2, A-4	0	100	95-100	60-100	12-45	<30	NP-7
	72-80	Variable---------	---	---	---	---	---	---	---	---	---
InA: Invershiel------	0-8	Loamy sand-------	SP-SM, SM	A-2	0	98-100	95-100	60-95	10-25	---	NP
	8-30	Clay loam, sandy clay, clay.	CL, CH	A-7	0	98-100	95-100	75-95	51-70	41-73	20-40
	30-65	Marl-------------	---	---	---	---	---	---	---	---	---
Pender----------	0-13	Fine sandy loam, loamy fine sand.	SM, SM-SC	A-2, A-4	0	100	100	60-85	30-50	<25	NP-10
	13-58	Sandy clay loam, clay loam.	SC, CL, CL-ML	A-6, A-7	0	100	100	80-100	35-70	30-45	10-20
	58-75	Variable---------	---	---	---	---	---	---	---	---	---
Jo--------------- Johns	0-17	Fine sandy loam--	SM, SC, SM-SC	A-2, A-4	0	100	95-100	70-98	20-49	<30	NP-10
	17-37	Sandy clay loam, sandy loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6, A-7	0	100	95-100	60-98	30-65	20-45	5-25
	37-60	Sand, loamy sand, coarse sand.	SM, SP-SM, SP	A-2, A-3	0	95-100	95-100	51-90	4-25	---	NP
KaA-------------- Kalmia	0-8	Loamy fine sand--	SM, SM-SC, SC	A-2, A-4	0	100	95-100	50-75	15-40	<25	NP-10
	8-39	Sandy clay loam, sandy loam, fine sandy loam.	SC, SM-SC	A-2, A-4, A-6	0	100	95-100	70-90	30-49	20-35	4-15
	39-80	Loamy sand, sand	SM, SP-SM, SP	A-2, A-3	0	100	95-100	50-70	4-25	---	NP
KeB-------------- Kenansville	0-24	Fine sand--------	SM	A-1, A-2	0	100	95-100	45-60	10-25	<25	NP-3
	24-33	Sandy loam, fine sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4	0	100	95-100	50-75	20-40	<30	NP-10
	33-80	Sand, loamy sand, loamy fine sand.	SP-SM, SM, SP	A-1, A-2, A-3	0	100	95-100	40-60	5-30	---	NP
KuB-------------- Kureb	0-80	Fine sand--------	SP, SP-SM	A-3	0	100	100	60-100	0-7	---	NP
LnA-------------- Leon	0-16	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	16-27	Sand, fine sand, loamy sand.	SM, SP-SM, SP	A-3, A-2-4	0	100	100	80-100	3-20	---	NP
	27-80	Sand, fine sand.	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
Ls--------------- Liddell	0-8	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	70-100	55-100	20-40	2-17
	8-80	Loam, silt loam, very fine sandy loam.	ML, CL-ML, CL	A-4, A-6	0	100	100	75-100	55-100	20-40	2-17

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lu Lumbee	0-13	Fine sandy loam.	SM, SM-SC	A-2, A-4	0	100	85-100	65-98	15-45	<20	NP-7
	13-35	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-4, A-6, A-7	0	100	90-100	65-98	36-60	19-45	7-25
	35-60	Loamy sand, sand, fine sand.	SP, SM, SP-SM	A-2, A-3	0	90-100	85-100	50-90	4-25	---	NP
Ma Mandarin	0-19	Fine sand	SP, SP-SM	A-3	0	100	100	90-100	2-10	---	NP
	19-32	Fine sand, sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-15	---	NP
	32-40	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-100	2-7	---	NP
	40-80	Fine sand, sand, loamy fine sand.	SP, SP-SM	A-3, A-2-4	0	100	100	90-100	3-12	---	NP
McC: Marvyn	0-12	Loamy fine sand	SM	A-2	0	95-100	90-100	50-80	13-30	---	NP
	12-45	Sandy clay loam, sandy clay.	ML, MH, SM	A-4, A-5, A-7	0	95-100	90-100	65-80	36-60	38-59	4-19
	45-80	Loamy sand, sandy loam, sandy clay loam.	SM, ML	A-1, A-2, A-4	0	95-100	90-100	45-85	20-55	<40	NP-10
Craven	0-6	Loam	ML, CL, SM, SC	A-4, A-6	0	100	100	75-100	45-90	<35	NP-15
	6-43	Clay, silty clay, clay loam.	CH	A-7	0	100	100	90-100	65-98	51-70	24-43
	43-80	Sandy clay loam, sandy loam, loamy sand.	SM, SM-SC, SC	A-2, A-4, A-6	0	100	95-100	50-100	15-49	<35	NP-15
Me Meggett	0-6	Loam	ML, CL-ML	A-4	0	100	90-100	85-100	51-75	<35	NP-10
	6-57	Clay, sandy clay, clay loam.	CH, MH, CL	A-6, A-7	0	100	90-100	85-100	51-90	30-60	12-30
	57-75	Stratified sand to clay.	---	---	---	---	---	---	---	---	---
Mk Muckalee	0-12	Loam	ML, SC, SM, SM-SC	A-2, A-4	0	95-100	90-100	50-95	30-60	<30	NP-10
	12-60	Sandy loam, loamy sand.	SM	A-2, A-4	0	95-100	80-100	60-90	20-40	<20	NP-4
Mu Murville	0-3	Muck	PT	---	---	---	---	---	---	---	---
	3-11	Mucky fine sand	SP-SM, SM	A-2, A-3	0	100	100	85-100	5-30	---	NP
	11-49	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-3	0	100	100	85-100	5-20	---	NP
	49-80	Sand, fine sand.	SM, SP-SM	A-2, A-3	0	100	100	85-100	5-20	---	NP
NhC Newhan	0-70	Fine sand	SP, SP-SM	A-3	0	95-100	95-100	60-75	0-5	---	NP
NkE: Newhan	0-70	Fine sand, sand.	SP, SP-SM	A-3	0	95-100	95-100	60-75	0-5	---	NP
Corolla	0-70	Fine sand, sand.	SW, SP-SM, SP	A-2, A-3	0	80-100	75-100	60-95	1-12	---	NP
NmE: Newhan	0-70	Fine sand, sand.	SP, SP-SM	A-3	0	95-100	95-100	60-75	0-5	---	NP
Corolla	0-70	Fine sand, sand.	SW, SP-SM, SP	A-2, A-3	0	80-100	75-100	60-95	1-12	---	NP
Urban land.											

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
NoA, NoB--------- Norfolk	0-12	Loamy fine sand--	SM	A-2	0	95-100	92-100	50-95	13-30	<20	NP
	12-61	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	95-100	91-100	70-96	30-63	20-38	4-15
	61-80	Variable---------	---	---	---	---	---	---	---	---	---
On--------------- Onslow	0-17	Loamy fine sand--	SM, SP-SM	A-2, A-3, A-4	0	100	95-100	60-100	5-38	---	NP
	17-63	Sandy clay loam, fine sandy loam, clay loam.	SC, CL, SC, ML	A-2, A-4, A-6	0	100	95-100	60-100	30-55	<30	NP-17
	63-80	Variable---------	---	---	---	---	---	---	---	---	---
PaA-------------- Pactolus	0-10	Fine sand--------	SM, SP-SM	A-2, A-3	0	100	100	51-100	6-30	---	NP
	10-80	Fine sand, loamy sand, loamy fine sand.	SP-SM, SM	A-2, A-3	0	100	100	51-100	5-30	---	NP
Pn--------------- Pantego	0-24	Mucky fine sandy loam, fine sandy loam.	OL, SM, SC ML, SM-SC	A-2, A-4	0	100	95-100	60-95	25-75	<35	NP-10
	24-59	Sandy clay loam, sandy loam, clay loam.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-2	0	100	95-100	70-100	30-80	20-40	4-16
	59-80	Clay loam, sandy clay, sandy clay loam.	CL, SC	A-6, A-7	0	100	95-100	90-100	36-80	25-49	11-24
Pt. Pits											
Ra--------------- Rains	0-14	Fine sandy loam.	SM, ML	A-2, A-4	0	100	95-100	50-85	25-56	<35	NP-10
	14-58	Sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	100	95-100	55-98	30-70	18-40	4-20
	58-68	Sandy loam, sandy clay loam, sandy clay.	SM, SC, ML, CL	A-2, A-4, A-6	0	100	95-100	60-95	30-60	16-40	3-18
	68-80	Variable---------	---	---	---	---	---	---	---	---	---
To--------------- Torhunta	0-3	Mucky fine sandy loam.	SM	A-2-4, A-4	0	100	95-100	70-85	20-49	<25	NP-4
	3-60	Sandy loam, fine sandy loam.	SM, SM-SC	A-2, A-4	0	100	95-100	70-92	20-40	<25	NP-7
	60-80	Loamy sand, sand, sandy loam.	SM, SP-SM, SM-SC	A-2, A-3	0	100	95-100	65-92	5-35	<25	NP-4
Wo--------------- Woodington	0-7	Fine sandy loam--	SM	A-2, A-4	0	100	95-100	50-100	20-50	<25	NP-3
	7-60	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	100	95-100	50-100	20-50	<25	NP-3
	60-80	Fine sandy loam, loamy sand, loamy fine sand.	SM, SP-SM	A-2, A-4	0	100	95-100	50-100	10-50	<25	NP-3

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AnB	0-5	1-12	1.35-1.55	2.0-6.0	0.05-0.10	4.5-6.5	Low	0.10	5	0-2
Alpin	5-42	1-7	1.40-1.55	6.0-20	0.03-0.09	4.5-6.5	Low	0.10		
	42-75	5-8	1.45-1.65	2.0-6.0	0.06-0.09	4.5-6.5	Low	0.10		
AtA	0-16	10-24	1.30-1.50	2.0-6.0	0.12-0.20	4.5-6.0	Low	0.24	5	.5-3
Altavista	16-40	18-35	1.30-1.50	0.6-2.0	0.12-0.20	4.5-6.0	Low	0.24		
	40-72	2-12	1.60-1.75	6.0-20	0.02-0.10	4.5-6.0	Low	----		
AuB	0-26	2-10	1.60-1.70	>6.0	0.04-0.09	4.5-6.5	Low	0.10	5	.5-1
Autryville	26-36	10-25	1.40-1.60	2.0-6.0	0.08-0.13	4.5-5.5	Low	0.10		
	36-50	2-8	1.60-1.70	>6.0	0.03-0.08	4.5-5.5	Low	0.10		
	50-80	10-35	1.40-1.60	0.6-2.0	0.10-0.15	4.5-5.5	Low	0.17		
AyA	0-10	4-15	1.30-1.60	2.0-6.0	0.15-0.20	4.5-6.0	Low	0.37	5	1-4
Aycock	10-61	18-35	1.30-1.60	0.2-2.0	0.15-0.20	4.5-5.5	Low	0.43		
	61-80	---	---	---	---	---	------------	----		
AyB2	0-4	4-15	1.30-1.60	2.0-6.0	0.15-0.20	4.5-6.0	Low	0.37	5	1-4
Aycock	4-60	18-35	1.30-1.60	0.2-2.0	0.15-0.20	4.5-5.5	Low	0.43		
	60-80	---	---	---	---	---	------------	----		
BaB	0-25	0-8	1.60-1.75	6.0-20	0.02-0.06	4.5-6.5	Low	0.10	5	.5-1
Baymeade	25-58	8-26	1.45-1.60	2.0-6.0	0.10-0.14	4.5-6.5	Low	0.10		
	58-80	0-12	1.60-1.75	6.0-20	0.02-0.10	4.5-6.5	Low	0.10		
Bo	0-12	30-60	1.20-1.40	0.06-0.2	0.02-0.06	6.1-8.4	High	0.28	5	5-25
Bohicket	12-45	35-60	1.30-1.60	<0.06	0.02-0.06	6.1-8.4	High	0.24		
	45-65	---	---	---	---	---	------------	----		
Ca	0-60	5-12	1.45-1.60	>6.0	0.02-0.10	5.6-8.4	Low	0.15	5	.5-2
Carteret										
Ch:										
Chewacla	0-5	10-27	1.30-1.60	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.28	5	1-4
	5-45	18-35	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.5	Low	0.28		
	45-58	18-35	1.30-1.50	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.32		
	58-72	---	---	---	---	---	------------	----		
Chastain	0-10	15-35	1.20-1.40	0.2-0.6	0.12-0.18	4.5-6.0	Moderate	0.32	5	2-6
	10-40	35-60	1.30-1.50	0.06-0.2	0.12-0.16	4.5-6.0	Moderate	0.37		
	40-70	2-10	1.50-1.70	6.0-20	0.03-0.06	4.5-6.0	Low	0.10		
Ct	0-35	---	0.40-0.65	0.06-6.0	0.35-0.45	<4.5	Low	----	---	25-60
Croatan	35-45	8-20	1.40-1.60	0.2-6.0	0.10-0.15	3.6-6.5	Low	----		
	45-75	10-35	1.40-1.60	0.2-2.0	0.12-0.20	3.6-6.5	Low	----		
	75-80	---	---	---	---	---	------------	----		
Do	0-14	---	0.25-0.40	0.6-2.0	0.25-0.50	3.6-4.4	------------	----	---	---
Dorovan	14-60	---	0.35-0.55	0.6-2.0	0.25-0.50	3.6-4.4	------------	----		
	60-75	5-20	1.40-1.65	6.0-20	0.05-0.08	4.5-5.5	Low	----		
EmA	0-12	6-18	1.30-1.50	2.0-6.0	0.15-0.20	4.5-6.0	Low	0.37	5	.5-2
Exum	12-80	18-35	1.30-1.40	0.2-0.6	0.15-0.20	4.5-5.5	Low	0.37		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
EuA:										
Exum	0-12	6-18	1.30-1.50	2.0-6.0	0.15-0.20	4.5-6.0	Low	0.37	5	.5-2
	12-80	18-35	1.30-1.40	0.2-0.6	0.15-0.20	4.5-5.5	Low	0.37		
Urban land.										
Fo	0-13	5-12	1.20-1.40	6.0-20	0.05-0.10	4.5-6.5	Low	0.15	5	.5-2
Foreston	13-66	10-18	1.20-1.40	2.0-6.0	0.09-0.13	4.5-6.0	Low	0.10		
	66-80	10-35	1.35-1.60	0.6-2.0	0.12-0.16	4.5-6.0	Low	0.20		
GoA	0-14	5-15	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.20	5	.5-2
Goldsboro	14-46	18-30	1.30-1.50	0.6-2.0	0.11-0.15	4.5-5.5	Low	0.24		
	46-63	20-34	1.30-1.40	0.2-2.0	0.11-0.15	4.5-5.5	Low	0.24		
	63-80	---	---	---	---	---	------------	----		
Gr	0-11	6-18	1.30-1.50	2.0-6.0	0.13-0.20	3.6-5.5	Low	0.37	5	2-4
Grantham	11-75	18-35	1.30-1.40	0.2-0.6	0.15-0.20	3.6-5.5	Low	0.43		
Gt	0-9	2-10	1.45-1.70	6.0-20	0.07-0.10	4.5-6.5	Low	0.17	5	2-4
Grifton	9-50	18-35	1.35-1.45	0.6-2.0	0.12-0.17	4.5-6.5	Low	0.24		
	50-72	2-18	1.45-1.70	2.0-20	0.07-0.14	5.6-8.4	Low	0.20		
	72-80	---	---	---	---	---	------------	----		
InA:										
Invershiel	0-8	3-10	1.50-1.70	2.0-6.0	0.07-0.12	4.5-6.5	Low	0.15	5	.5-2
	8-30	35-50	1.30-1.50	0.06-0.2	0.14-0.18	5.1-7.8	High	0.32		
	30-65	---	---	---	---	---	------------	----		
Pender	0-13	5-17	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.5	Low	0.37	5	.5-2
	13-58	20-35	1.30-1.60	0.6-2.0	0.10-0.15	5.6-7.8	Moderate	0.49		
	58-75	---	---	---	---	---	------------	----		
Jo	0-17	5-15	1.45-1.65	2.0-6.0	0.10-0.15	4.5-5.5	Low	0.20	5	.5-2
Johns	17-37	18-35	1.40-1.60	0.6-2.0	0.12-0.15	4.5-5.5	Low	0.24		
	37-60	2-10	1.60-1.75	6.0-20	0.03-0.06	4.5-5.5	Low	0.10		
KaA	0-8	4-12	1.60-1.75	2.0-6.0	0.06-0.10	4.5-6.0	Low	0.15	5	.5-2
Kalmia	8-39	18-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24		
	39-80	2-10	1.60-1.75	6.0-20	0.03-0.06	4.5-5.5	Low	0.10		
KeB	0-24	3-10	1.5-1.7	6.0-20	0.04-0.10	4.5-6.0	Low	0.15	5	.5-2
Kenansville	24-33	5-18	1.3-1.5	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.15		
	33-80	1-10	1.5-1.7	6.0-20	<0.05	4.5-6.0	Low	----		
KuB	0-80	0-3	1.60-1.80	6.0-20	<0.05	4.5-7.3	Low	0.10	5	<2
Kureb										
LnA	0-16	1-6	1.40-1.65	6.0-20	0.02-0.05	3.6-5.5	Low	0.10	5	.5-4
Leon	16-27	2-8	1.50-1.70	0.6-6.0	0.05-0.10	3.6-5.5	Low	0.15		
	27-80	1-6	1.40-1.65	0.6-6.0	0.02-0.05	3.6-5.5	Low	0.10		
Ls	0-8	5-25	1.35-1.55	2.0-6.0	0.15-0.22	4.5-5.5	Low	0.43	5	1-3
Liddell	8-80	5-25	1.35-1.55	0.6-2.0	0.14-0.19	4.5-5.5	Low	0.43		
Lu	0-13	4-18	1.55-1.70	2.0-6.0	0.08-0.12	4.5-5.5	Low	0.24	5	2-4
Lumbee	13-35	18-35	1.30-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.32		
	35-60	1-10	1.60-1.75	6.0-20	0.03-0.06	4.5-5.5	Low	0.10		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Ma---------------	0-19	0-3	1.35-1.45	6.0-20	0.03-0.07	3.6-6.0	Low---------	0.10	5	<3
Mandarin	19-32	2-9	1.45-1.60	0.6-2.0	0.10-0.15	3.6-6.0	Low---------	0.15		
	32-40	0-3	1.35-1.45	6.0-20	0.03-0.07	3.6-7.3	Low---------	0.10		
	40-80	2-9	1.45-1.60	0.6-2.0	0.10-0.15	3.6-7.3	Low---------	0.15		
McC:										
Marvyn-----------	0-12	2-12	1.35-1.70	2.0-6.0	0.06-0.11	4.5-6.0	Low---------	0.17	4	<2
	12-45	25-45	1.40-1.60	0.6-2.0	0.11-0.16	4.5-6.0	Low---------	0.32		
	45-80	10-30	1.40-1.60	0.2-2.0	0.07-0.14	4.5-6.0	Low---------	0.32		
Craven-----------	0-6	27-40	1.30-1.45	0.2-2.0	0.12-0.15	3.6-6.5	Low---------	0.32	5	.5-2
	6-43	35-60	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	Moderate----	0.32		
	43-80	5-35	1.35-1.60	0.2-6.0	0.08-0.14	3.6-5.5	Low---------	0.32		
Me---------------	0-6	15-25	1.20-1.40	0.6-2.0	0.15-0.20	4.5-6.5	Low---------	0.28	5	2-8
Meggett	6-57	40-60	1.50-1.75	0.06-0.2	0.13-0.18	6.1-8.4	High--------	0.32		
	57-75	---	---	---	---	---	------------	----		
Mk---------------	0-12	10-25	1.20-1.40	0.6-2.0	0.09-0.15	5.1-7.3	Low---------	0.20	5	---
Muckalee	12-60	5-20	1.45-1.65	0.6-2.0	0.08-0.12	5.6-8.4	Low---------	0.20		
Mu---------------	0-3	---	0.40-0.65	0.06-6.0	0.35-0.45	3.6-5.5	Low---------	----	---	25-60
Murville	3-11	2-8	1.45-1.60	6.0-20	0.05-0.09	3.6-5.5	Low---------	0.10		2-9
	11-49	2-8	1.60-1.75	2.0-6.0	0.05-0.09	3.6-5.5	Low---------	0.10		
	49-80	2-8	1.45-1.60	6.0-20	0.05-0.09	3.6-5.5	Low---------	----		
NhC--------------	0-70	0-3	1.60-1.75	>20	<0.05	3.6-7.8	Low---------	0.10	5	---
Newhan										
NkE:										
Newhan-----------	0-70	0-3	1.60-1.75	>20	<0.05	3.6-7.8	Low---------	0.10	5	---
Corolla----------	0-70	0-3	1.60-1.70	>20	0.01-0.03	5.6-7.8	Low---------	0.10	5	<.5
NmE:										
Newhan-----------	0-70	0-3	1.60-1.75	>20	<0.05	3.6-7.8	Low---------	0.10	5	---
Corolla----------	0-70	0-3	1.60-1.70	>20	0.01-0.03	5.6-7.8	Low---------	0.10	5	<.5
Urban land.										
NoA, NoB---------	0-12	2-8	1.55-1.75	6.0-20	0.06-0.11	4.5-6.0	Low---------	0.17	5	.5-2
Norfolk	12-61	18-35	1.30-1.45	0.6-2.0	0.10-0.20	4.5-5.5	Low---------	0.24		
	61-80	---	---	---	---	---	------------	----		
On---------------	0-17	2-8	1.60-1.75	>6.0	0.07-0.11	3.6-5.5	Low---------	0.17	4	.5-2
Onslow	17-63	15-35	1.30-1.50	0.6-2.0	0.12-0.17	3.6-5.5	Low---------	0.24		
	63-80	---	---	---	---	---	------------	----		
PaA--------------	0-10	2-12	1.60-1.75	6.0-20	0.05-0.10	4.5-6.0	Low---------	0.10	5	.5-2
Pactolus	10-80	2-12	1.60-1.75	6.0-20	0.03-0.07	4.5-5.5	Low---------	0.10		
Pn---------------	0-24	5-15	1.20-1.40	0.6-2.0	0.20-0.30	3.6-5.5	Low---------	0.10	5	10-15
Pantego	24-59	18-35	1.30-1.40	0.6-2.0	0.12-0.20	3.6-5.5	Low---------	0.28		
	59-80	18-40	1.25-1.40	0.6-2.0	0.15-0.20	3.6-5.5	Low---------	0.28		
Pt.										
Pits										

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Ra	0-14	5-20	1.30-1.60	2.0-6.0	0.10-0.14	3.6-6.5	Low	0.20	5	1-6
Rains	14-58	18-35	1.30-1.50	0.6-2.0	0.11-0.15	3.6-5.5	Low	0.24		
	58-68	15-45	1.30-1.60	0.6-2.0	0.10-0.15	3.6-5.5	Low	0.28		
	68-80	---	---	---	---	---	------------	----		
To	0-3	5-18	1.20-1.40	0.6-2.0	0.20-0.30	3.6-5.5	Low	0.10	5	10-15
Torhunta	3-60	5-18	1.35-1.60	2.0-6.0	0.10-0.15	3.6-5.5	Low	0.15		
	60-80	2-18	1.45-1.65	6.0-20	<0.05	3.6-6.5	Low	0.10		
Wo	0-7	5-18	1.45-1.65	2.0-6.0	0.10-0.15	3.6-5.5	Low	0.20	5	2-4
Woodington	7-60	5-18	1.45-1.65	2.0-6.0	0.10-0.15	3.6-5.5	Low	0.20		
	60-80	3-18	1.45-1.65	2.0-20	0.06-0.15	3.6-5.5	Low	0.10		

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
AnB Alpin	A	None	---	---	>6.0	---	---	Low	High.
AtA Altavista	C	Rare	---	---	1.5-2.5	Apparent	Dec-Mar	Moderate	Moderate.
AuB Autryville	A	None	---	---	4.0-6.0	Apparent	Jan-Apr	Low	High.
AyA, AyB2 Aycock	B	None	---	---	4.0-6.0	Perched	Jan-Apr	Moderate	High.
BaB Baymeade	A	None	---	---	4.0-5.0	Apparent	Dec-Apr	Low	Moderate.
Bo Bohicket	D	Frequent	Very brief	Jan-Dec	+3-0	Apparent	Jan-Dec	High	High.
Ca Carteret	D	Frequent	Very brief	Jan-Dec	+3-1.0	Apparent	Jan-Dec	High	High.
Ch: Chewacla	C	Frequent	Brief	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	High	Moderate.
Chastain	D	Frequent	Very long	Dec-Apr	0-1.0	Apparent	Nov-May	High	High.
Ct Croatan	D	Rare	---	---	0-1.0	Apparent	Dec-May	High	High.
Do Dorovan	D	Frequent	Very long	Jan-Dec	+1-0.5	Apparent	Jan-Dec	High	High.
EmA Exum	C	None	---	---	2.0-3.0	Apparent	Dec-Apr	Moderate	High.
EuA: Exum	C	None	---	---	2.0-3.0	Apparent	Dec-Apr	Moderate	High.
Urban land.									
Fo Foreston	C	None	---	---	2.0-3.5	Apparent	Dec-Apr	Moderate	High.
GoA Goldsboro	B	None	---	---	2.0-3.0	Apparent	Dec-Apr	Moderate	High.
Gr Grantham	D	None	---	---	0-1.0	Apparent	Dec-May	High	High.
Gt Grifton	D	None	---	---	0.5-1.0	Apparent	Dec-May	High	Low.
InA: Invershiel	C	None	---	---	1.0-2.5	Perched	Dec-Mar	High	Moderate.
Pender	C	None	---	---	1.5-2.5	Apparent	Dec-Mar	Moderate	Moderate.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
Jo---------------- Johns	C	Rare--------	---	---	1.5-3.0	Apparent	Dec-Apr	Moderate	High.
KaA--------------- Kalmia	B	None--------	---	---	4.0-6.0	Apparent	Dec-Apr	Moderate	Moderate.
KeB--------------- Kenansville	A	None--------	---	---	4.0-6.0	Apparent	Dec-Apr	Low------	High.
KuB--------------- Kureb	A	None--------	---	---	>6.0	---	---	Low------	Low.
LnA--------------- Leon	B/D	None--------	---	---	0-1.0	Apparent	Nov-Apr	High-----	High.
Ls---------------- Liddell	B/D	None--------	---	---	+1-1.5	Apparent	Nov-Apr	High-----	High.
Lu---------------- Lumbee	B/D	Occasional	Brief to long.	Nov-Mar	0-1.5	Apparent	Nov-Apr	High-----	High.
Ma---------------- Mandarin	C	None--------	---	---	1.5-3.5	Apparent	Dec-Mar	Moderate	High.
McC:									
Marvyn-----------	B	None--------	---	---	>6.0	---	---	Moderate	High.
Craven-----------	C	None--------	---	---	2.0-3.0	Apparent	Dec-Apr	High-----	High.
Me---------------- Meggett	D	Rare--------	---	---	0-1.0	Apparent	Nov-Apr	High-----	Moderate.
Mk---------------- Muckalee	D	Frequent----	Brief-----	Nov-Apr	0.5-1.5	Apparent	Dec-Mar	High-----	Moderate.
Mu---------------- Murville	A/D	None--------	---	---	+1-1.0	Apparent	Nov-May	High-----	Moderate.
NhC--------------- Newhan	A	Rare--------	---	---	>6.0	---	---	High-----	Low.
NkE:									
Newhan-----------	A	Rare--------	---	---	>6.0	---	---	High-----	Low.
Corolla----------	D	Rare--------	---	---	1.5-3.0	Apparent	Nov-May	Low------	Low.
NmE:									
Newhan-----------	A	Rare--------	---	---	>6.0	---	---	High-----	Low.
Corolla----------	D	Rare--------	---	---	1.5-3.0	Apparent	Nov-May	Low------	Low.
Urban land.									
NoA, NoB---------- Norfolk	B	None--------	---	---	4.0-6.0	Apparent	Jan-Mar	Moderate	High.
On---------------- Onslow	B	None--------	---	---	1.5-3.0	Apparent	Dec-Apr	High-----	High.
PaA--------------- Pactolus	C	None--------	---	---	1.5-3.0	Apparent	Dec-Apr	Low------	High.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
Pn---------------- Pantego	B/D	Rare---------	---	---	0-1.5	Apparent	Dec-May	High------	High.
Pt. Pits									
Ra---------------- Rains	B/D	None---------	---	---	0-1.0	Apparent	Nov-Apr	High------	High.
To---------------- Torhunta	C	Rare---------	---	---	0.5-1.5	Apparent	Dec-May	High------	High.
Wo---------------- Woodington	B/D	None---------	---	---	0.5-1.0	Apparent	Dec-May	High------	High.

TABLE 17.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution							Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--				Percentage smaller than--					Maximum dry density	Optimum moisture
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm				
										Pct		Lb/ft^3	Pct
Chewacla loam: 1/ (S83NC-071-020)													
Bw - - - - - 5-20	A-6(9)	CL	---	---	100	71	51	31	23	37	14	102	18
Bg - - - - - 20-45	A-4(5)	CL	---	---	99	58	37	24	17	29	10	109	15
BCg- - - - - 45-58	A-7(5)	CL	---	---	99	87	64	40	28	42	20	104	16
Grantham loam: 1/ 4/ (S83NC-071-036)													
Ap - - - - - 0-8	A-4(8)	ML	---	---	99	97	42	17	11	21	2	109	13
Btgl - - - - 11-33	A-6(10)	CL	---	---	100	99	56	34	25	34	15	111	16
BCg- - - - - 62-75	A-7(17)	CL	---	---	100	98	48	38	32	48	29	110	15
Grifton loamy fine sand: 1/ 6/ (S83NC-071-038)													
Ap - - - - - 0-8	A-4(10)	SM	---	---	96	39	10	7	5	20	NP	106	18
Btg2 - - - - 30-50	A-6(5)	CL	---	---	97	56	31	26	22	29	13	116	12
Invershiel loamy sand: 2/ 5/ (S83NC-071-042)													
Ap - - - - - 0-7	A-4(0)	SM	---	---	92	38	16	11	7	16	NP	117	10
Bt2- - - - - 13-22	A-7(15)	CH	---	---	93	60	50	42	38	51	34	103	19
Cg - - - - - 44-58	A-7(20)	CH	---	---	96	73	59	53	50	75	56	99	15
Liddell silt loam: 1/ (S83NC-071-054)													
Ap - - - - - 0-8	A-4(8)	ML	---	---	99	80	32	9	5	29	2	102	14
Bg3, Cgl - - 25-65	A-4(8)	MC-ML	---	---	100	83	42	20	15	22	5	117	12
Cg2 - - - - 65-80	A-6(10)	CL	---	---	100	80	44	27	23	32	15	113	14
Pantego mucky fine sandy loam: 3/ (S83NC-071-054)													
A - - - - - - 0-13	A-4(3)	SC	---	---	87	49	33	18	12	27	10	104	16
Btg- - - - - 16-62	A-6(4)	SC	---	---	73	45	35	26	19	30	16	118	12

1/ See "Soil Series and Their Morphology" for location of sample pedon.

2/ Invershiel loamy sand; 2.2 miles east of Rocky Point, 25 feet southwest of junction of State Route 1518 and North Carolina 210.

3/ Pantego mucky fine sandy loam; 1 mile east of Atkinson; 0.7 mile west of junction of North Carolina 53 and State Route 1128, then 0.2 mile north of North Carolina 53.

4/ The percentage passing sieve No. 200 for the three samples reported is slightly greater than is allowed for the Grantham series.

5/ The surface texture of this pedon is fine sandy loam. It is finer than is typical for this soil in Pender County, and the depth to marl is greater for this profile than is allowed for the series.

6/ The surface texture of this pedon is fine sandy loam. It is finer than is typical for this soil in Pender County.

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Alpin	Thermic, coated Typic Quartzipsamments
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Autryville	Loamy, siliceous, thermic Arenic Paleudults
Aycock	Fine-silty, siliceous, thermic Typic Paleudults
Baymeade	Loamy, siliceous, thermic Arenic Hapludults
Bohicket	Fine, mixed, nonacid, thermic Typic Sulfaquents
Carteret	Mixed, thermic Typic Psammaquents
Chastain	Fine, mixed, acid, thermic Typic Fluvaquents
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Corolla	Thermic, uncoated Aquic Quartzipsamments
Craven	Clayey, mixed, thermic Aquic Hapludults
Croatan	Loamy, siliceous, dysic, thermic Terric Medisaprists
Dorovan	Dysic, thermic Typic Medisaprists
Exum	Fine-silty, siliceous, thermic Aquic Paleudults
Foreston	Coarse-loamy, siliceous, thermic Aquic Paleudults
Goldsboro	Fine-loamy, siliceous, thermic Aquic Paleudults
Grantham	Fine-silty, siliceous, thermic Typic Paleaquults
Grifton	Fine-loamy, siliceous, thermic Typic Ochraqualfs
Invershiel	Fine, montmorillonitic, thermic Albaquic Hapludalfs
Johns	Fine-loamy over sandy or sandy-skeletal, siliceous, thermic Aquic Hapludults
Kalmia	Fine-loamy over sandy or sandy-skeletal, siliceous, thermic Typic Hapludults
Kenansville	Loamy, siliceous, thermic Arenic Hapludults
Kureb	Thermic, uncoated Spodic Quartzipsamments
Leon	Sandy, siliceous, thermic Aeric Haplaquods
Liddell	Coarse-silty, siliceous, acid, thermic Typic Haplaquepts
Lumbee	Fine-loamy over sandy or sandy-skeletal, siliceous, thermic Typic Ochraquults
Mandarin	Sandy, siliceous, thermic Typic Haplohumods
Marvyn	Fine-loamy, siliceous, thermic Typic Hapludults
Meggett	Fine, mixed, thermic Typic Albaqualfs
Muckalee	Coarse-loamy, siliceous, nonacid, thermic Typic Fluvaquents
Murville	Sandy, siliceous, thermic Typic Haplaquods
Newhan	Thermic, uncoated Typic Quartzipsamments
Norfolk	Fine-loamy, siliceous, thermic Typic Paleudults
Onslow	Fine-loamy, siliceous, thermic Spodic Paleudults
Pactolus	Thermic, coated Aquic Quartzipsamments
Pantego	Fine-loamy, siliceous, thermic Umbric Paleaquults
Pender	Fine-loamy, siliceous, thermic Albaquic Hapludalfs
Rains	Fine-loamy, siliceous, thermic Typic Paleaquults
Torhunta	Coarse-loamy, siliceous, acid, thermic Typic Humaquepts
Woodington	Coarse-loamy, siliceous, thermic Typic Paleaquults

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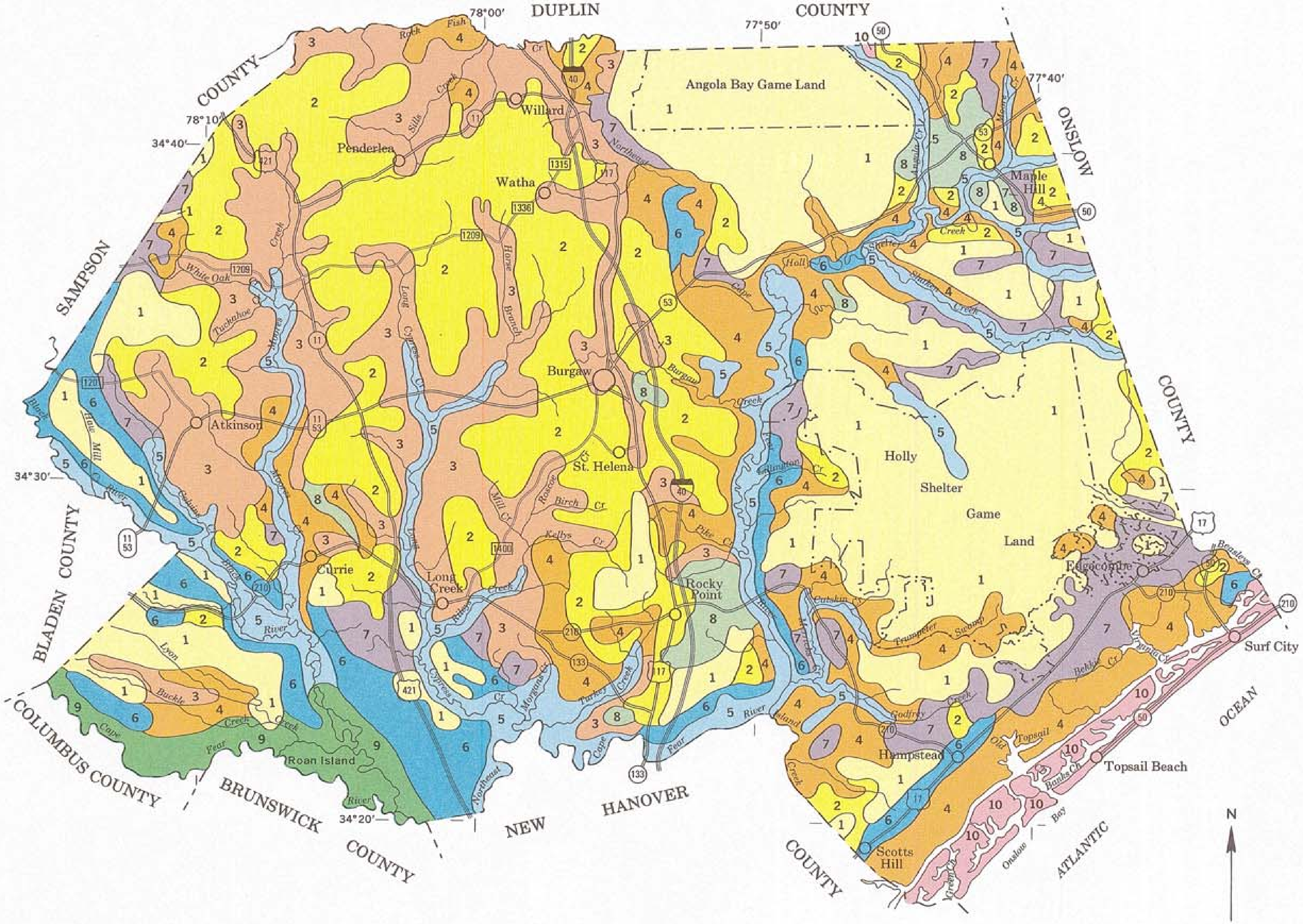


LEGEND

DOMINANTLY VERY POORLY DRAINED TO MODERATELY WELL DRAINED SOILS; ON THE UPLANDS AND STREAM TERRACES

1	Murville-Croatan-Torhunta: Nearly level, very poorly drained soils that have a mucky or loamy surface layer and a sandy or loamy subsoil
2	Rains-Woodington-Liddell: Nearly level, poorly drained soils that have a loamy surface layer and a loamy subsoil
3	Leon-Mandarin: Nearly level, poorly drained and somewhat poorly drained soils that are sandy throughout
4	Grifton-Meggett-Invershiel: Nearly level, poorly drained and moderately well drained soils that have a sandy or loamy surface layer and a loamy or clayey subsoil

DOMINANTLY EXCESSIVELY DRAINED TO SOMEWHAT POORLY DRAINED SOILS; ON THE UPLANDS AND TERRACES

5	Goldsboro-Norfolk-Exum: Nearly level to gently sloping, moderately well drained and well drained soils that have a sandy or loamy surface layer and a loamy subsoil
6	Foreston-Autryville-Baymeade: Nearly level to gently sloping, moderately well drained and well drained soils that have a sandy surface layer and a loamy or sandy subsoil
7	Alpin-Pactolus-Kureb: Nearly level to gently sloping, excessively drained and moderately well drained to somewhat poorly drained soils that are sandy throughout

DOMINANTLY SOMEWHAT POORLY DRAINED TO VERY POORLY DRAINED SOILS; ON THE FLOOD PLAINS

8	Muckalee-Dorovan: Nearly level, poorly drained and very poorly drained soils that have a loamy surface layer underlain by a loamy and sandy material or are sapric material (muck)
9	Chewacla-Chastain: Nearly level, somewhat poorly drained and poorly drained soils that have a loamy surface layer and a loamy subsoil

DOMINANTLY EXCESSIVELY DRAINED, MODERATELY WELL DRAINED TO SOMEWHAT POORLY DRAINED, AND VERY POORLY DRAINED SOILS; ON THE OUTER BANKS AND IN THE TIDAL MARSHES

10	Carteret-Newhan-Corolla: Nearly level to moderately steep, very poorly drained, excessively drained, and moderately well drained to somewhat poorly drained soils that are sandy throughout

Compiled 1989

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE
NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE
PENDER COUNTY BOARD OF COMMISSIONERS

GENERAL SOIL MAP

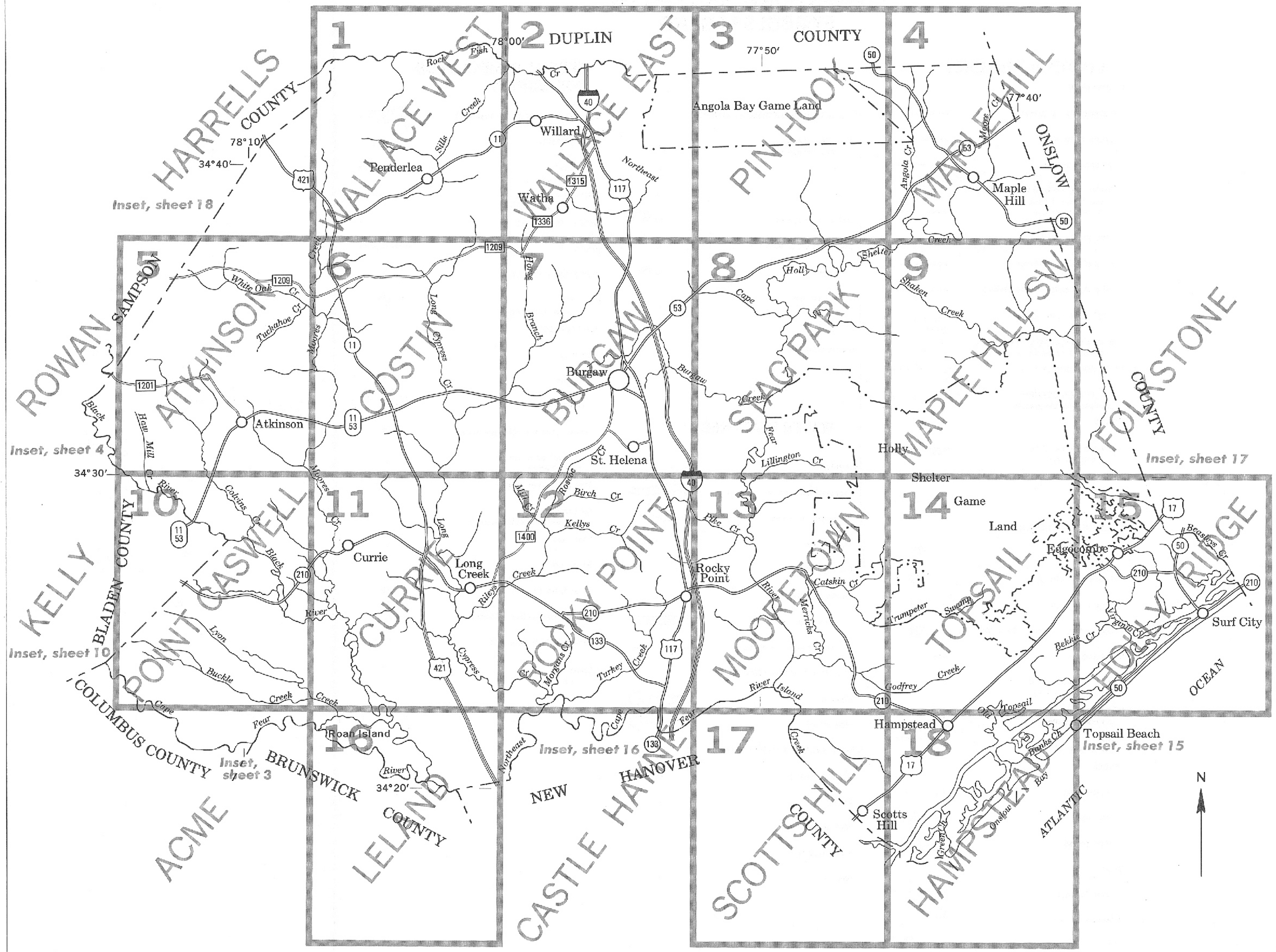
PENDER COUNTY, NORTH CAROLINA

Scale 1:253,440

1 0 1 2 3 4 Mi

1 0 4 8 Km

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

PENDER COUNTY, NORTH CAROLINA

Scale 1:253,440

1 0 1 2 3 4 Mi

1 0 4 8 Km

SOIL LEGEND

The first letter, always a capital, is the initial letter of the soil or miscellaneous area name. The second letter is a small letter. The third letter, if used, is always a capital and shows the slope. The fourth letter, if used, is the number 2 and indicates the map unit is eroded. Symbols without slope letters are those of nearly level soils or miscellaneous areas.

SYMBOL	NAME
AnB	Alpin fine sand, 1 to 6 percent slopes
AtA	Altavista fine sandy loam, 0 to 3 percent slopes
AuB	Autryville fine sand, 1 to 4 percent slopes
AyA	Aycock loam, 0 to 3 percent slopes
AyB2	Aycock loam, 3 to 6 percent slopes, eroded
BaB	Baymeade fine sand, 1 to 4 percent slopes
Bo	Bohicket silty clay loam, frequently flooded
Ca	Carteret fine sand, frequently flooded
Ch	Chewacla and Chastain soils, frequently flooded
Ct	Croatan muck
Do	Dorovan muck, frequently flooded
EmA	Exum loam, 0 to 2 percent slopes
EuA	Exum-Urban land complex, 0 to 2 percent slopes
Fo	Foreston loamy fine sand
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes
Gr	Grantham loam
Gt	Grifton loamy fine sand
InA	Invershiel-Pender complex, 0 to 2 percent slopes
Jo	Johns fine sandy loam
KaA	Kalmia loamy fine sand, 0 to 2 percent slopes
KeB	Kenansville fine sand, 0 to 4 percent slopes
KuB	Kureb fine sand, 2 to 6 percent slopes
LnA	Leon fine sand, 0 to 2 percent slopes
Ls	Liddell silt loam
Lu	Lumbee fine sandy loam, occasionally flooded
Ma	Mandarin fine sand
McC	Marvyn and Craven soils, 6 to 12 percent slopes
Me	Meggett loam
Mk	Muckalee loam, frequently flooded
Mu	Murville muck
NhC	Newhan fine sand, dredged, 2 to 10 percent slopes
NkE	Newhan-Corolla complex, 0 to 30 percent slopes
NmE	Newhan-Corolla-Urban land complex, 0 to 30 percent slopes
NoA	Norfolk loamy fine sand, 0 to 2 percent slopes
NoB	Norfolk loamy fine sand, 2 to 6 percent slopes
On	Onslow loamy fine sand
PaA	Pactolus fine sand, 0 to 2 percent slopes
Pn	Pantego mucky fine sandy loam
Pt	Pits
Ra	Rains fine sandy loam
To	Torhunta mucky fine sandy loam
Wo	Woodington fine sandy loam

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label) — Swift Airport

- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants) — ∟ ⊥ + ┼

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

Interstate		21
Federal	US 117	173
State	NC 53	28
County, farm or ranch	SR 1001	1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown) — ×——×

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small — water, w

PITS

- Gravel pit — ⚒
- Mine or quarry — ⚒

MISCELLANEOUS CULTURAL FEATURES

Farmstead, house (omit in urban areas)	■
Church	
School	
Indian mound (label)	Indian Mound
Located object (label)	○ Tower
Tank (label)	● Gas
Wells, oil or gas	
Windmill	
Kitchen midden	

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water, w
- Intermittent — int, i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot — ψ

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS	Bo Ca
ESCARPMENTS	
Bedrock (points down slope)	vvvvvvvvvvvvvvvvvv
Other than bedrock (points down slope)	
SHORT STEEP SLOPE	. . . .
GULLY	∿∿∿∿∿∿∿∿∿∿
DEPRESSION OR SINK	◊
SOIL SAMPLE (normally not shown)	Ⓢ
MISCELLANEOUS	
Blowout	◡
Clay spot	※
Gravelly spot	∘°∘
Gumbo, slick or scabby spot (sodic)	ø
Dumps and other similar non soil areas	☰
Prominent hill or peak	
Rock outcrop (includes sandstone and shale)	v
Saline spot	+
Sandy spot	∴
Severely eroded spot	≑
Slide or slip (tips point upslope)	)))
Stony spot, very stony spot	0 ∞
Sand Pit <3 Acres	⌑

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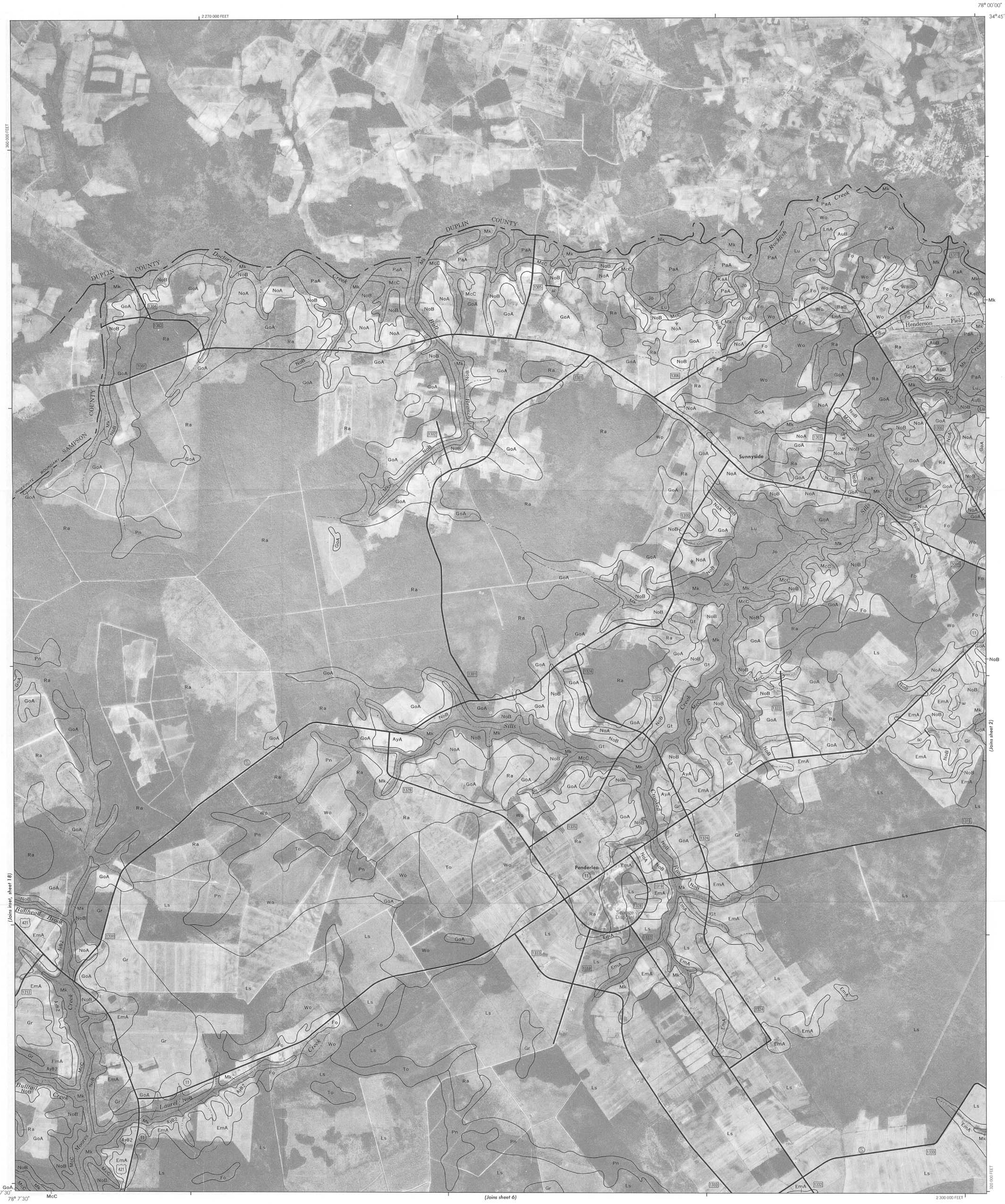
SOIL CONSERVATION SERVICE

SHEET NUMBER 1
PENDER COUNTY, NORTH CAROLINA



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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

PENDER COUNTY, NORTH CAROLINA NO. 1

SHEET NO. 1 OF 18

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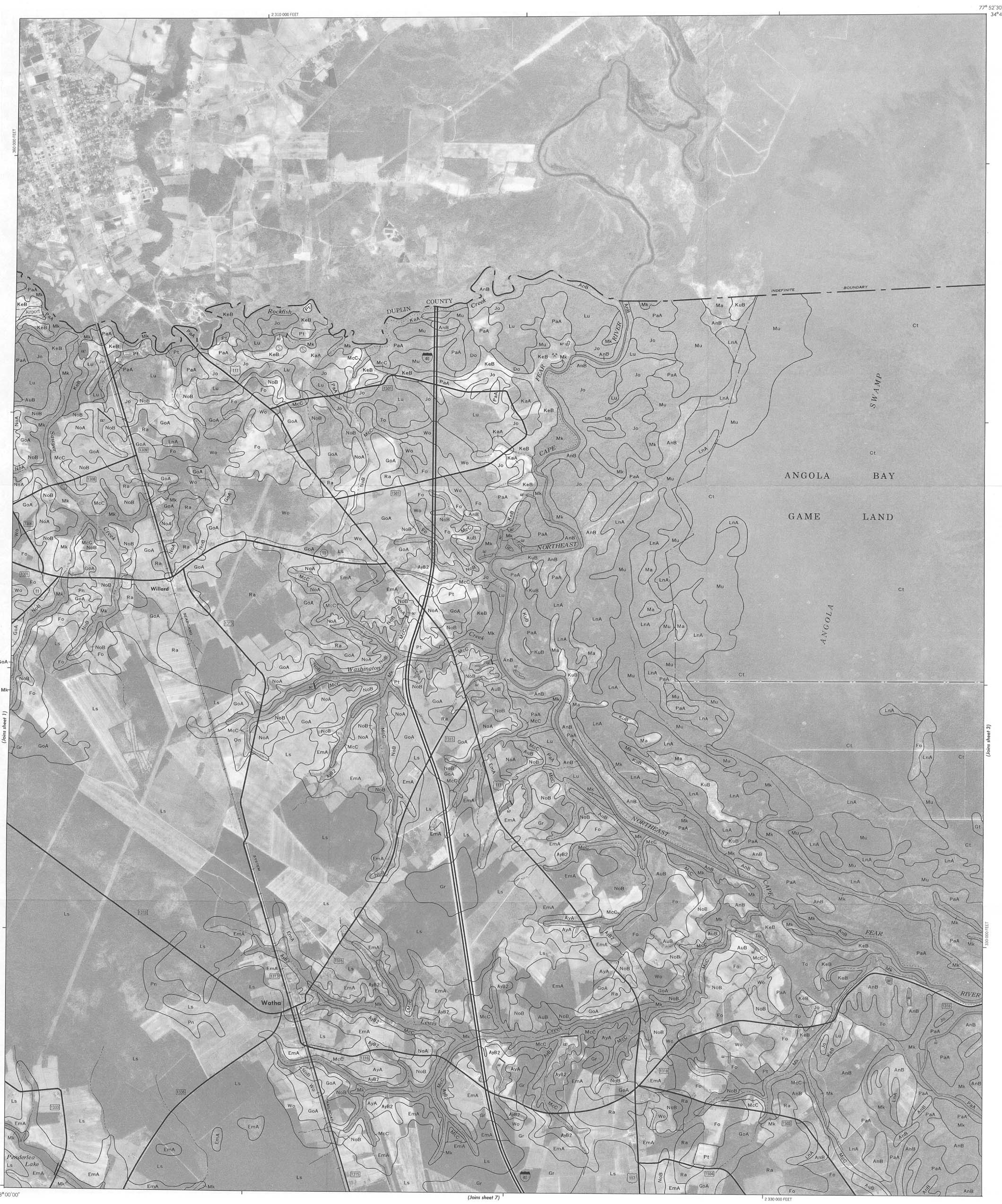

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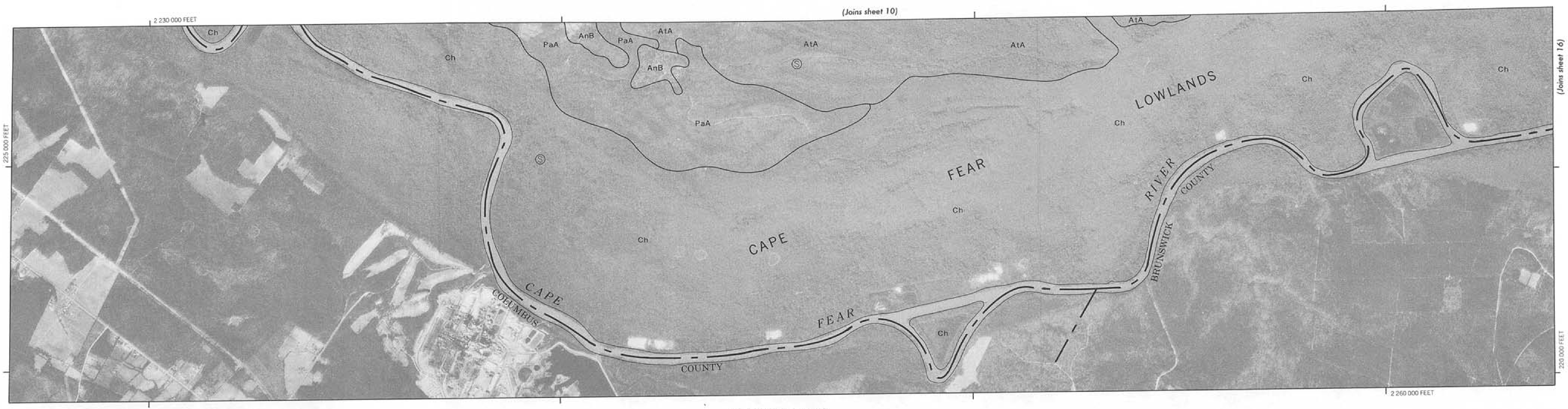

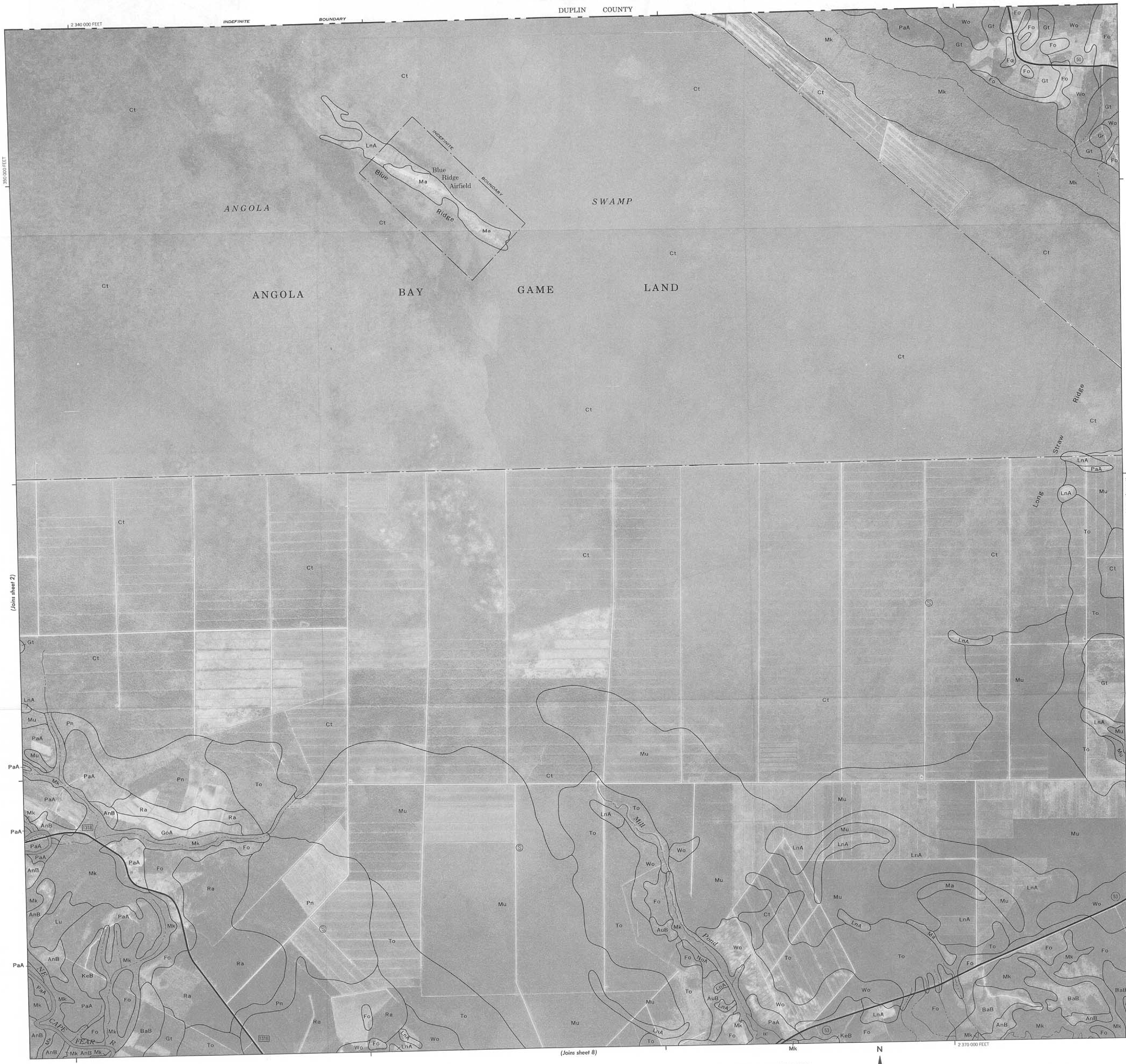

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1 .5 0 1 2 3 Kilometers
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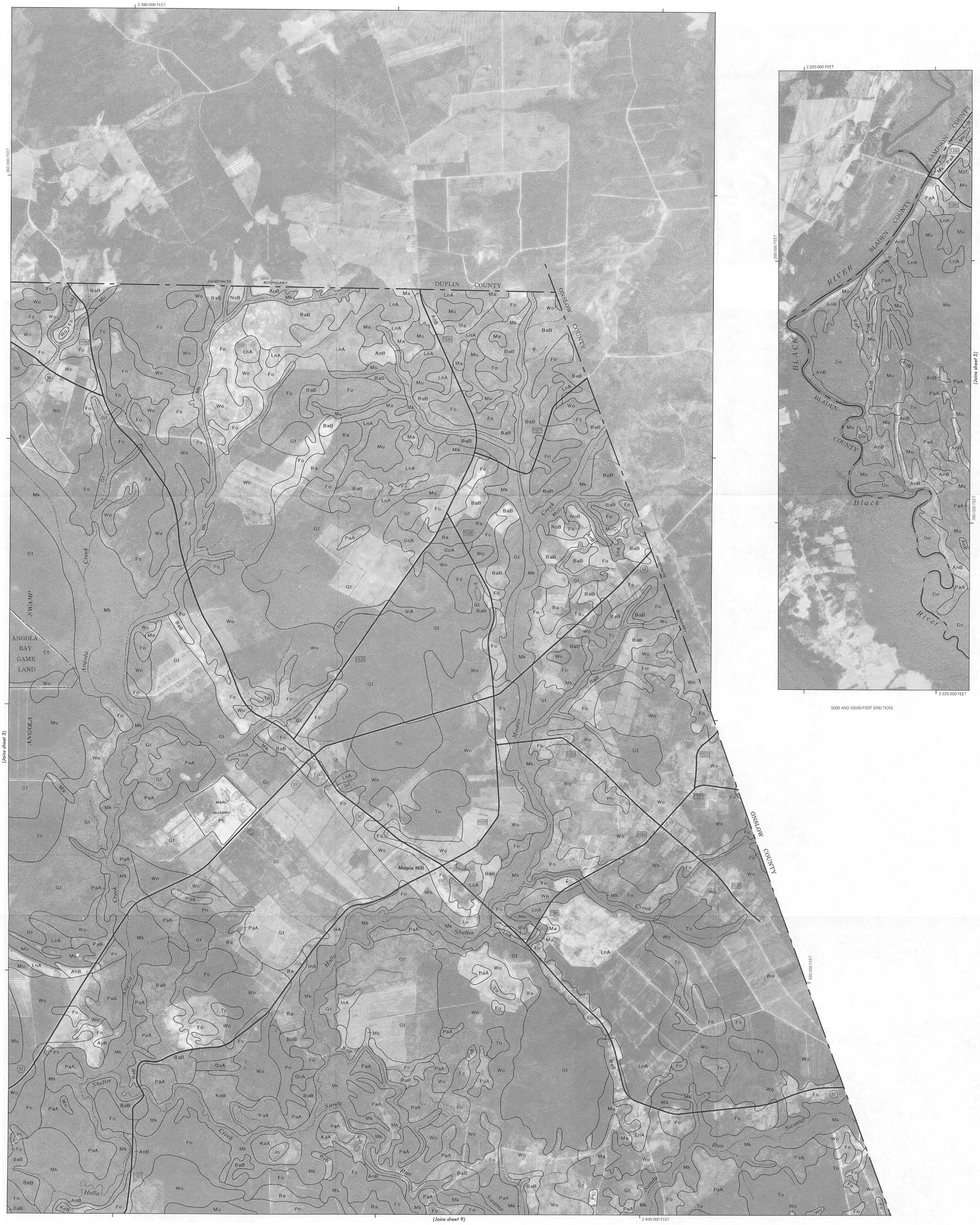

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

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PENDER COUNTY, NORTH CAROLINA NO. 4

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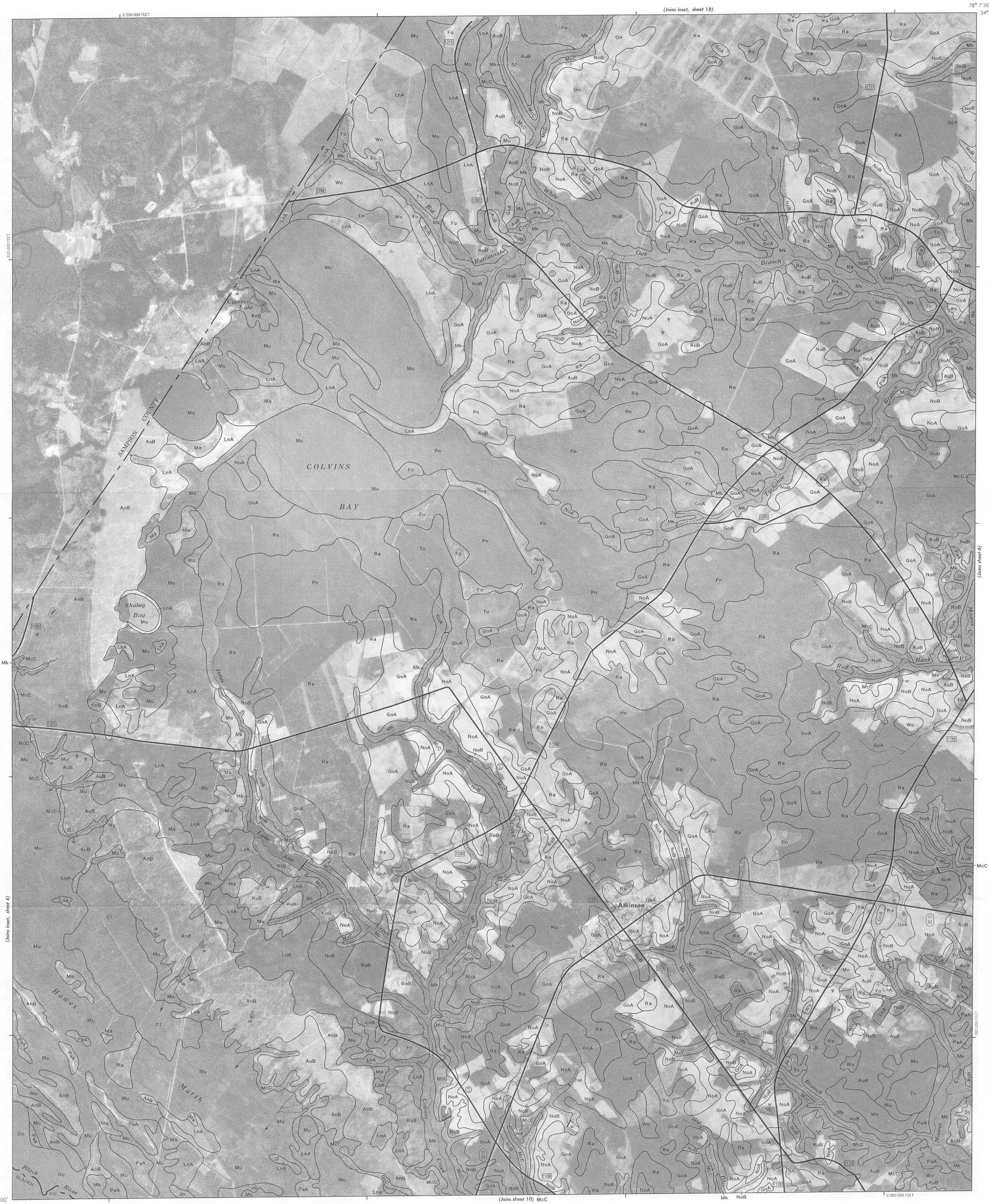
PENDER COUNTY, NORTH CAROLINA



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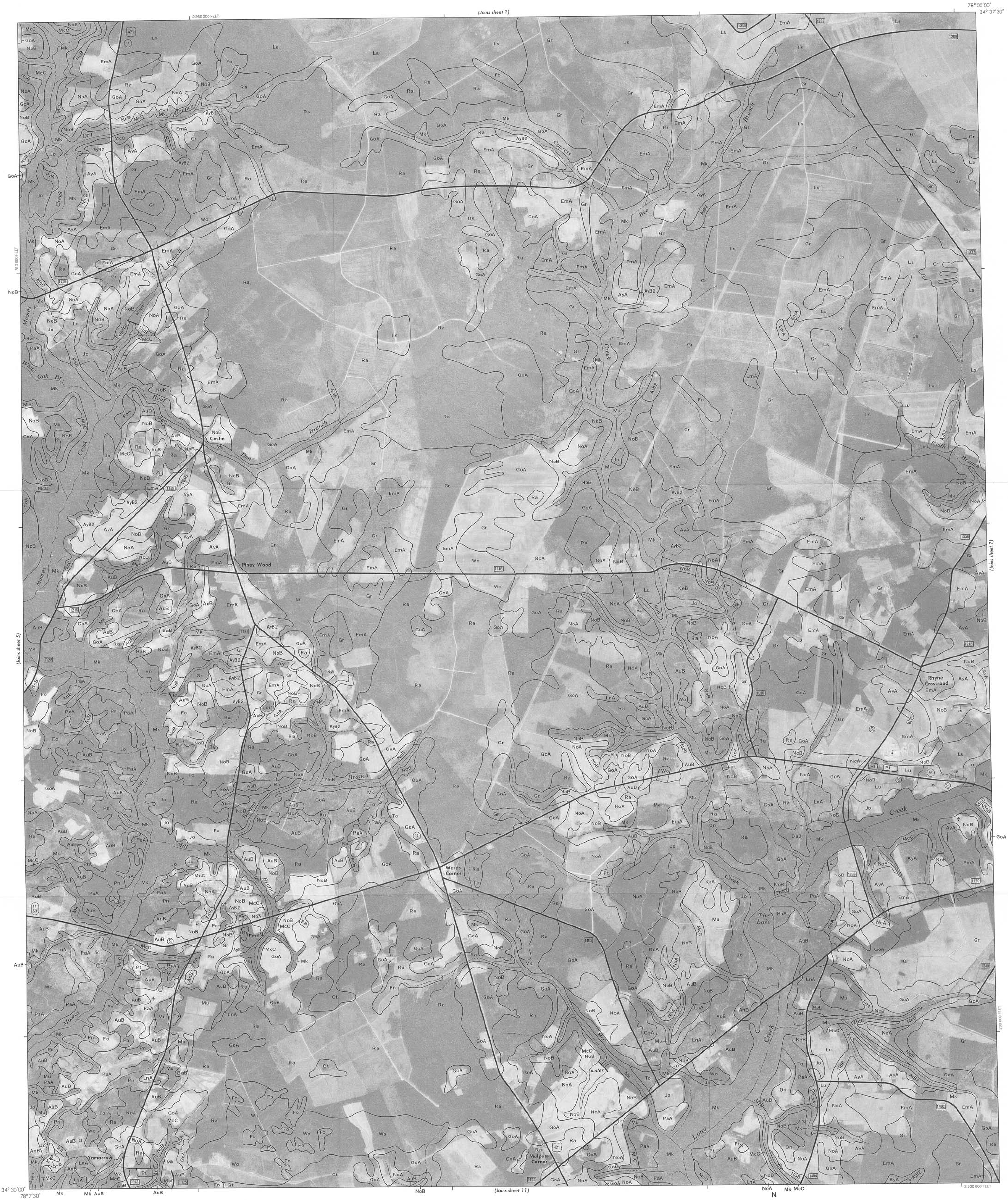

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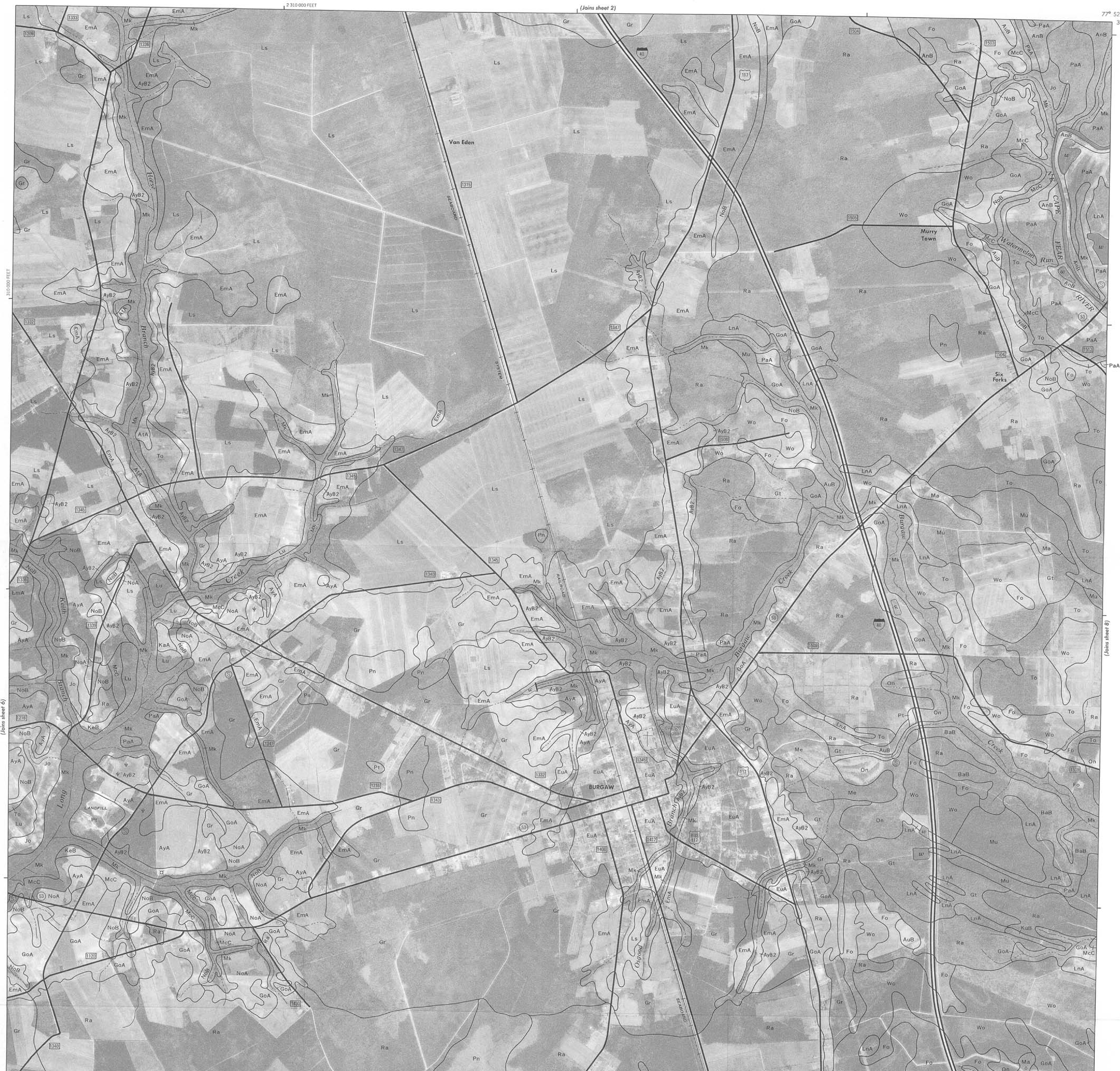
SHEET NO. 6 OF 1



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Scale - 1:24000

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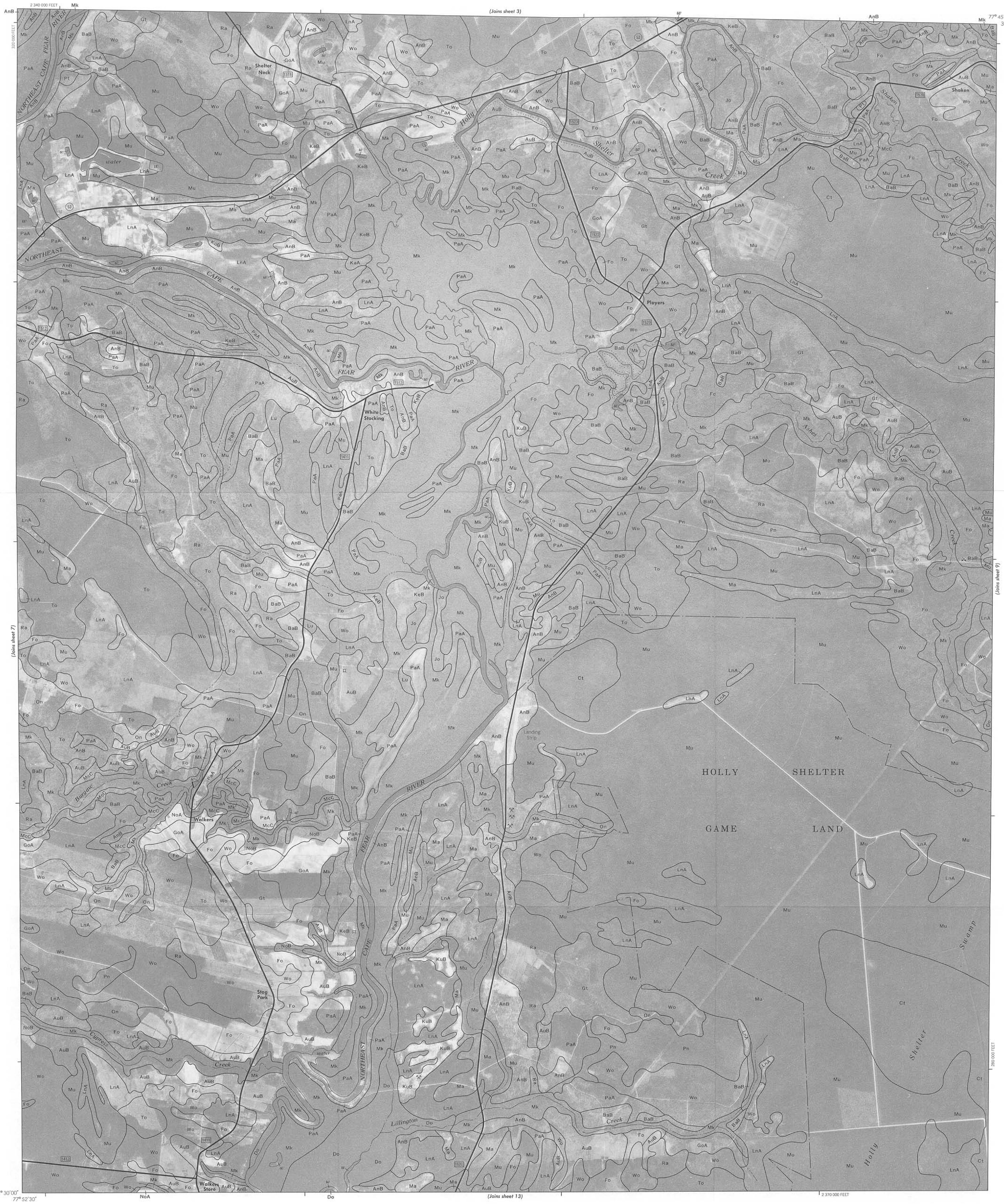
PENDER COUNTY, NORTH CAROLINA



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1 .5 0 1 2 3 Kilometers
Scale - 1:24000

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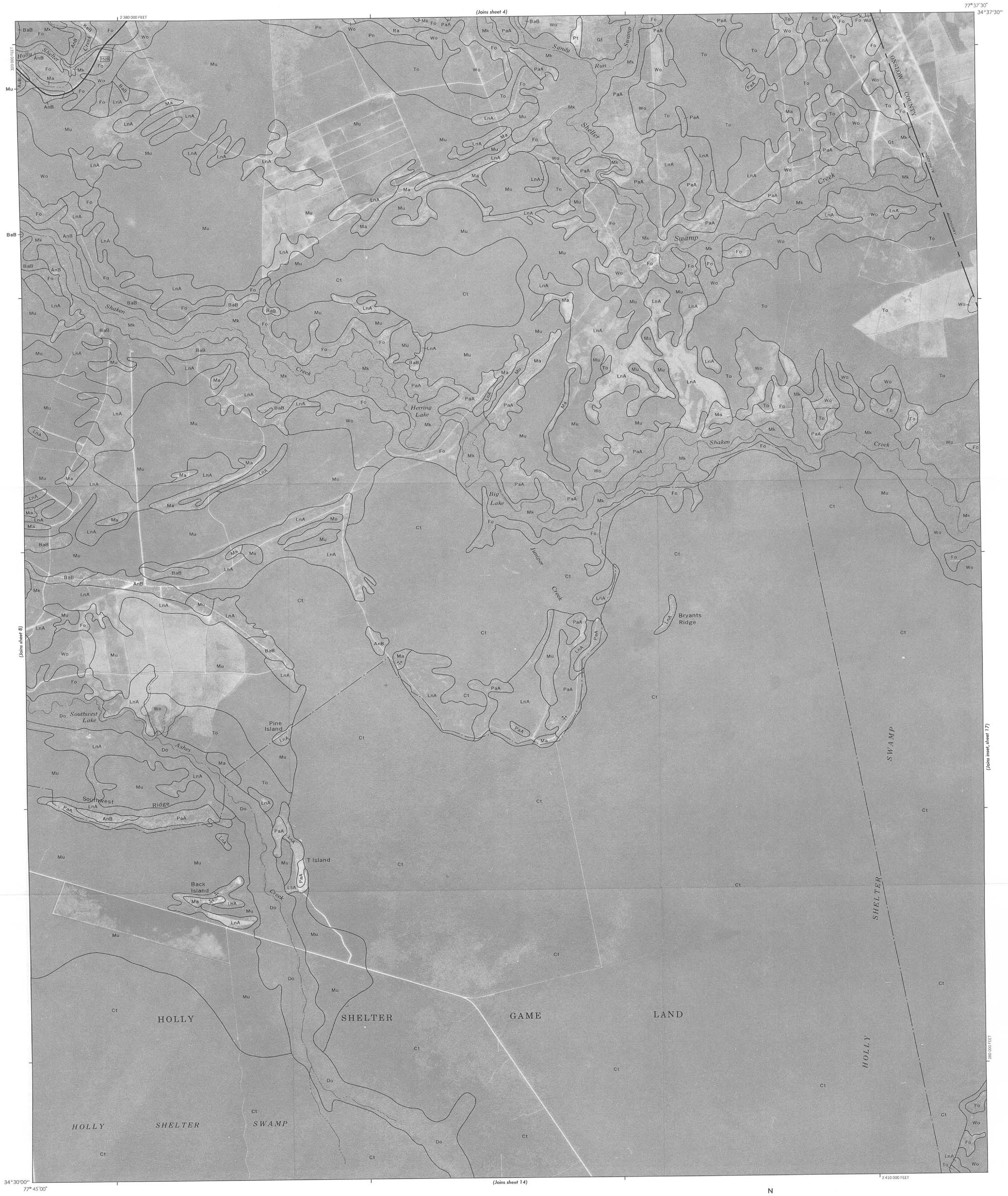
PENDER COUNTY, NORTH CAROLINA



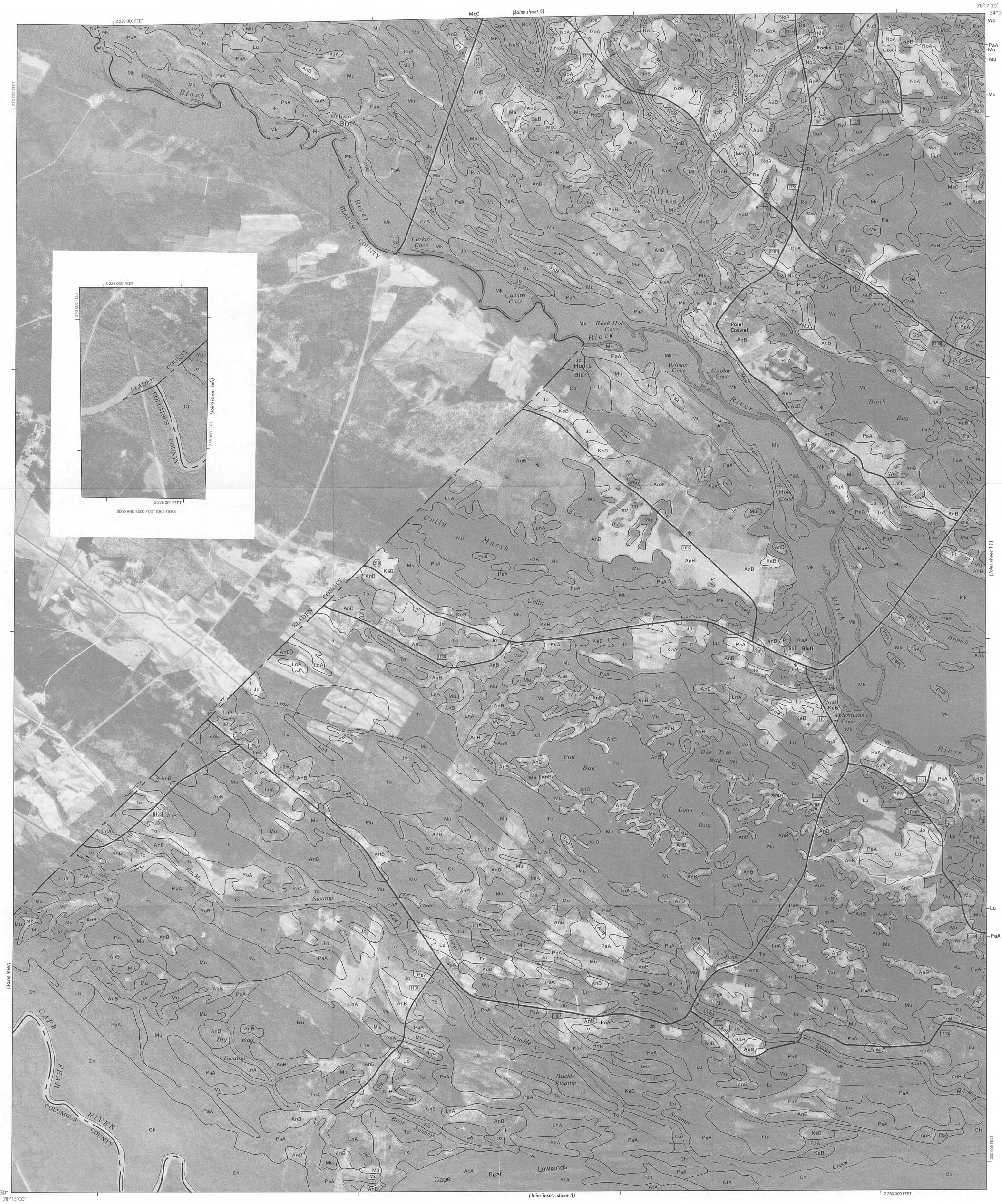
5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24 000

N

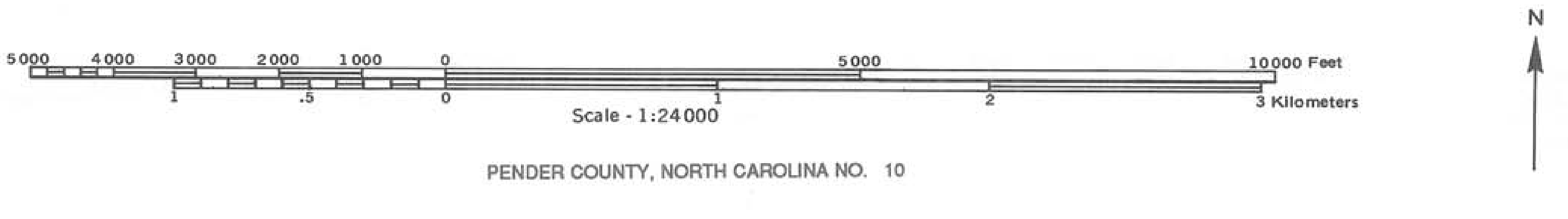
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 10
PENDER COUNTY, NORTH CAROLINA



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

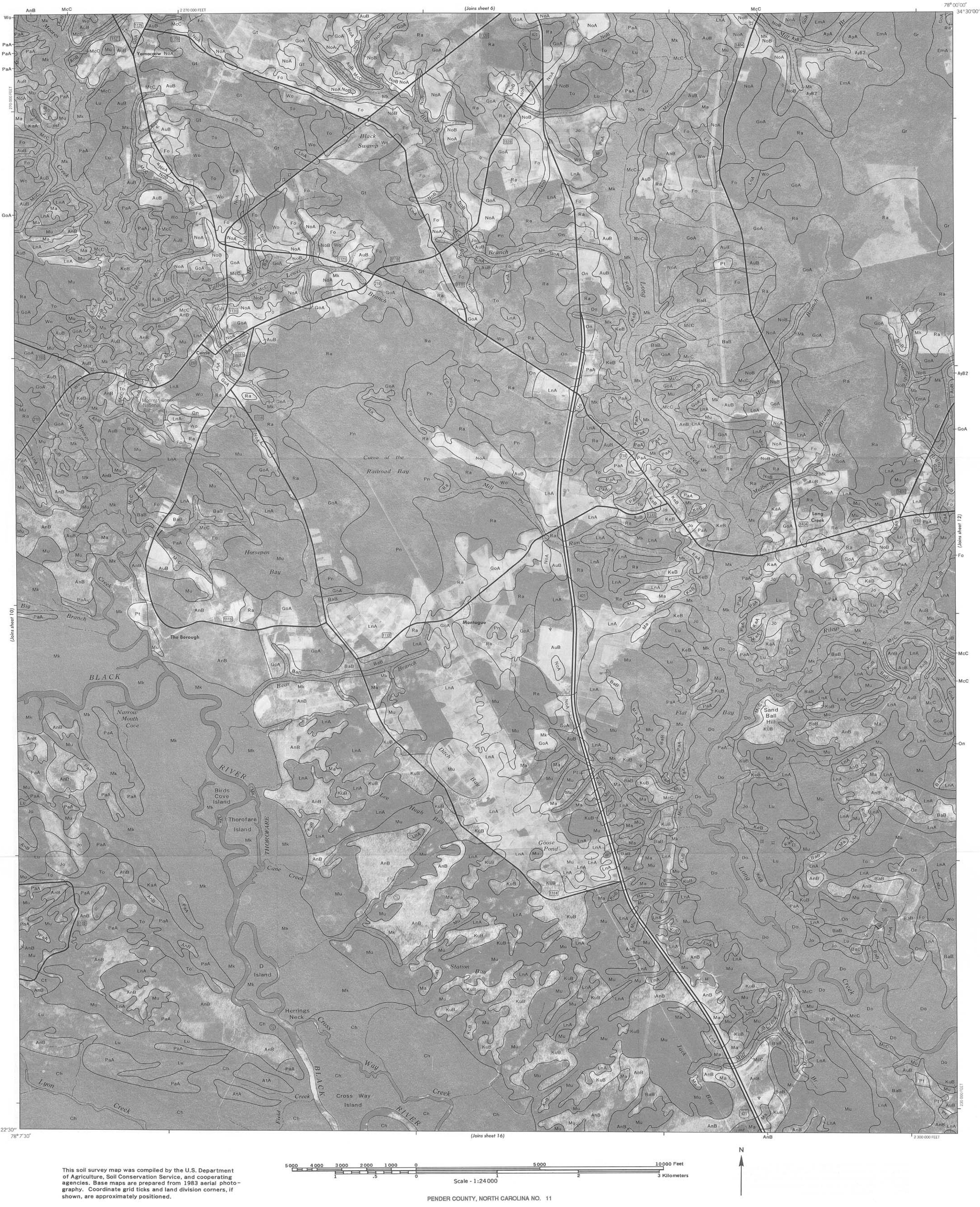


PENDER COUNTY, NORTH CAROLINA NO. 10

SHEET NO. 10 OF 18

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 11
PENDER COUNTY, NORTH CAROLINA



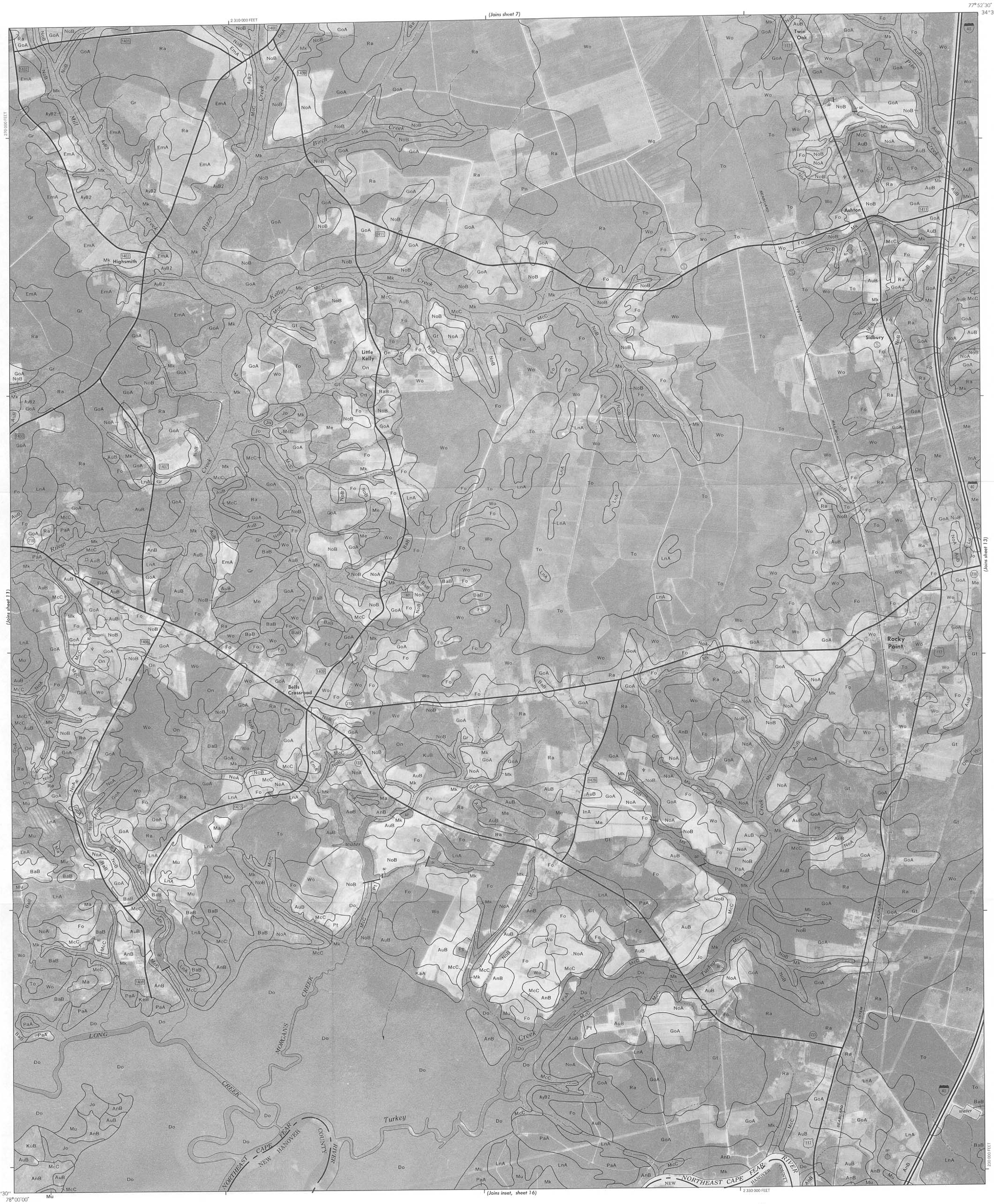
5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24 000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 12
PENDER COUNTY, NORTH CAROLINA



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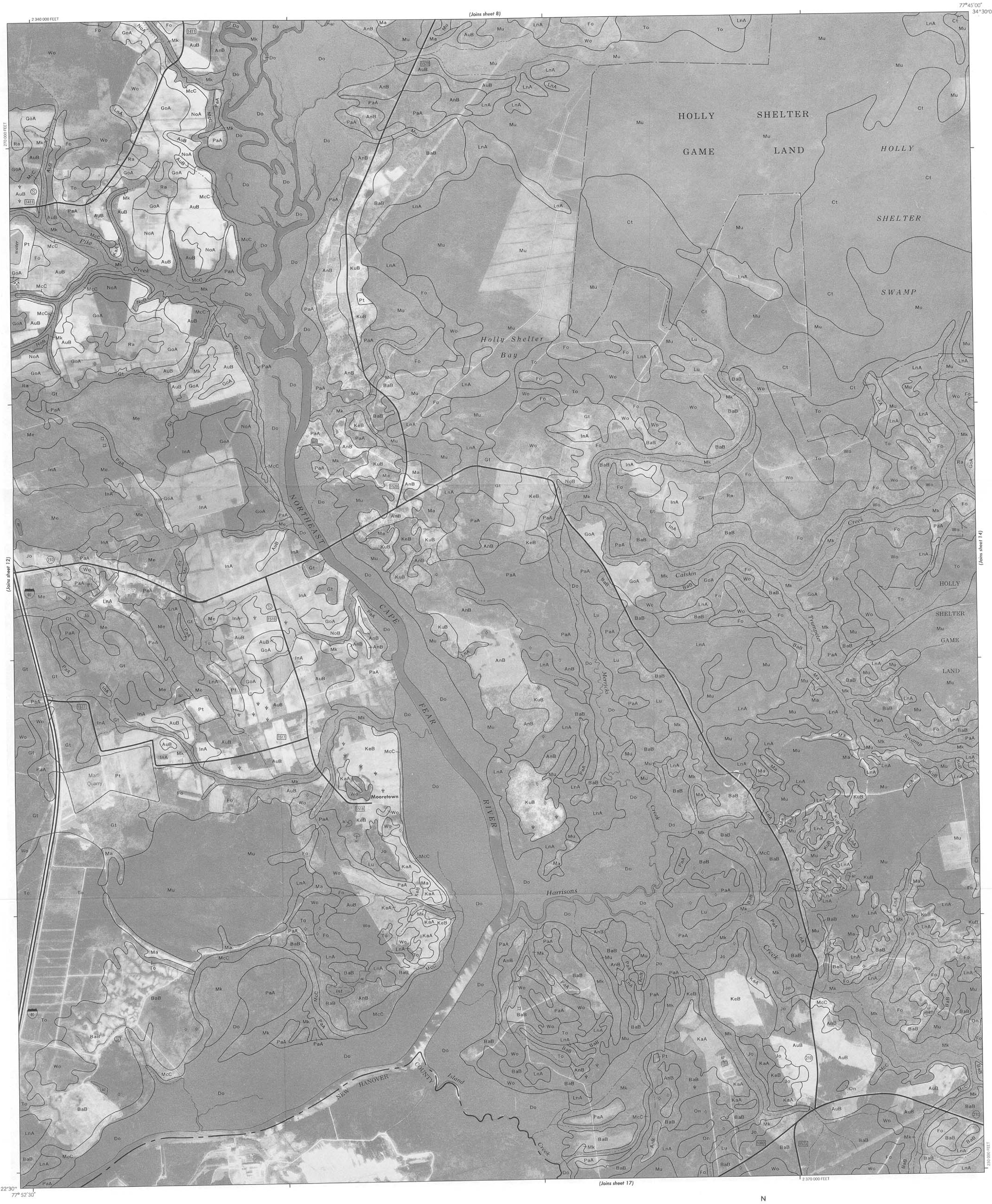
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

PENDER COUNTY, NORTH CAROLINA NO. 12



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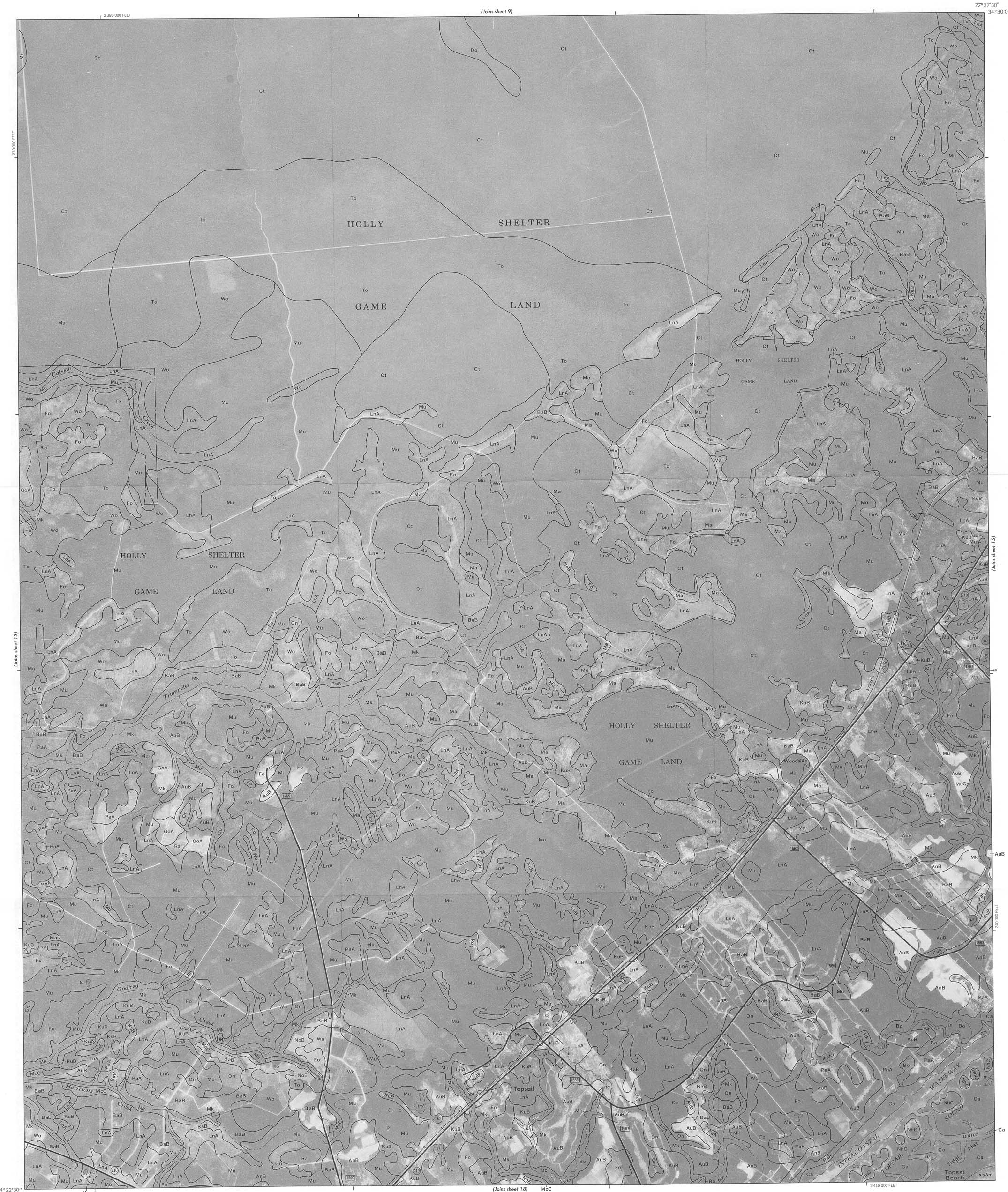
Scale - 1:24000

PENDER COUNTY, NORTH CAROLINA NO. 13



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

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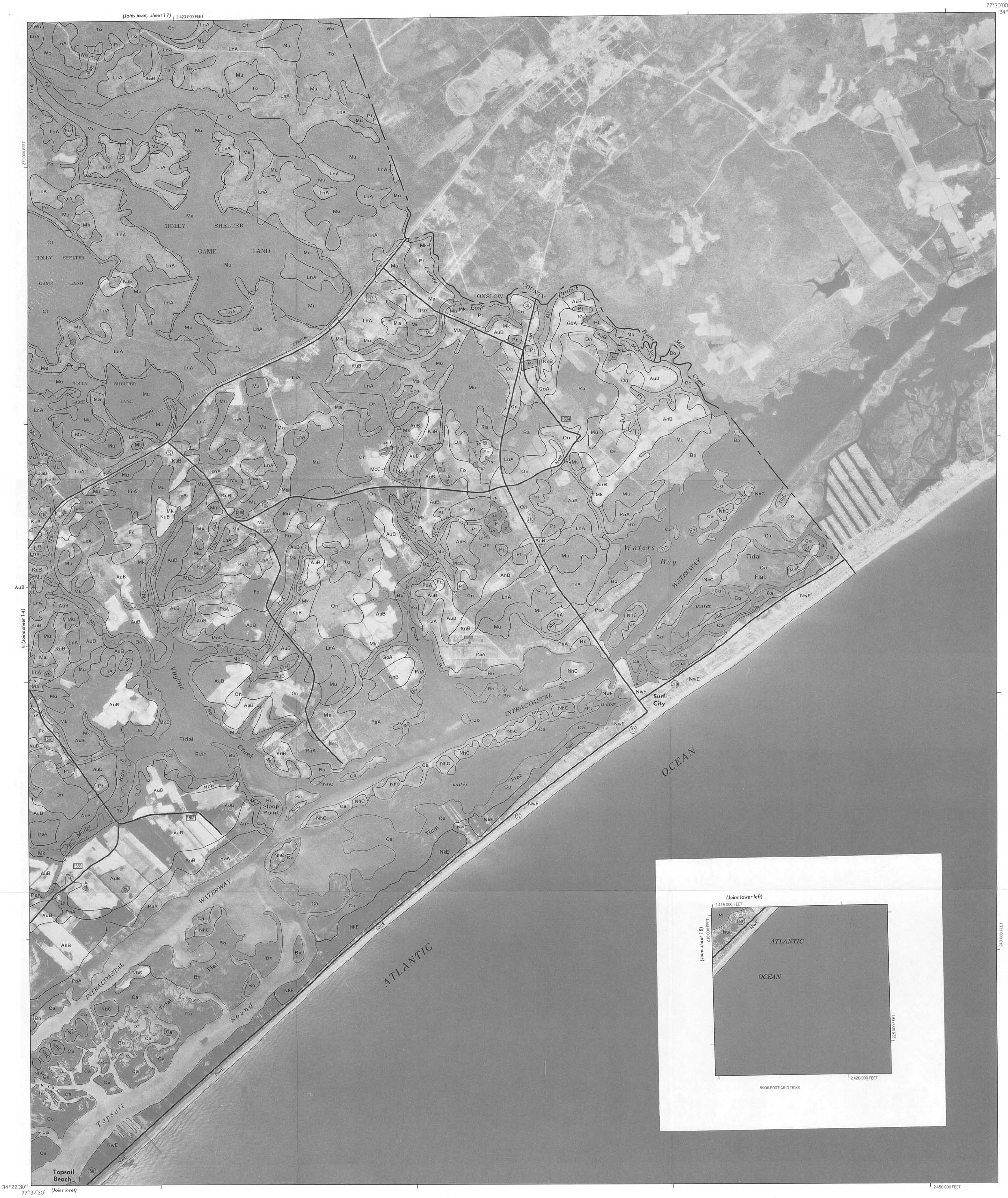
PENDER COUNTY, NORTH CAROLINA NO. 14

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 15
PENDER COUNTY, NORTH CAROLINA



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24 000

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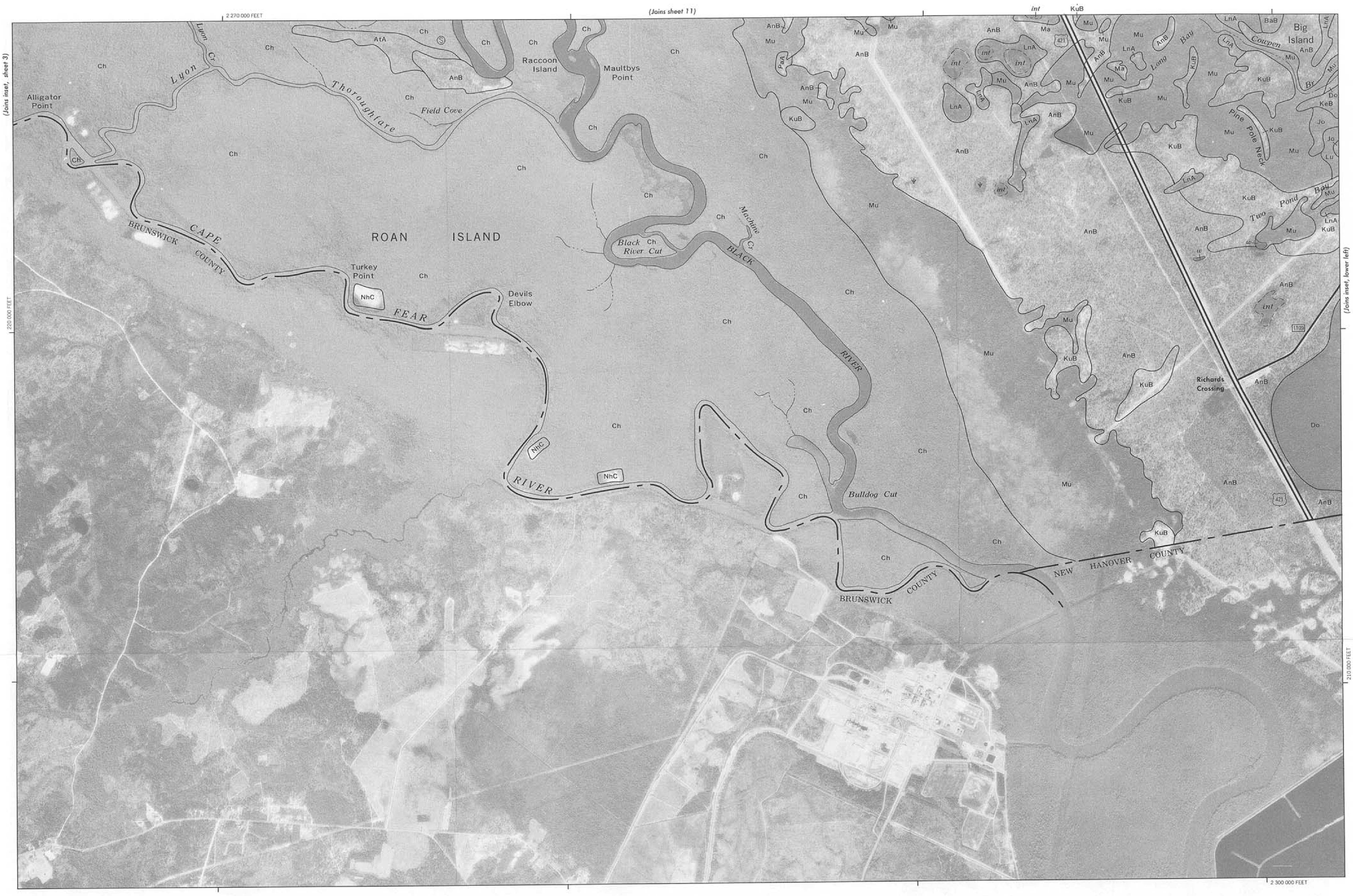
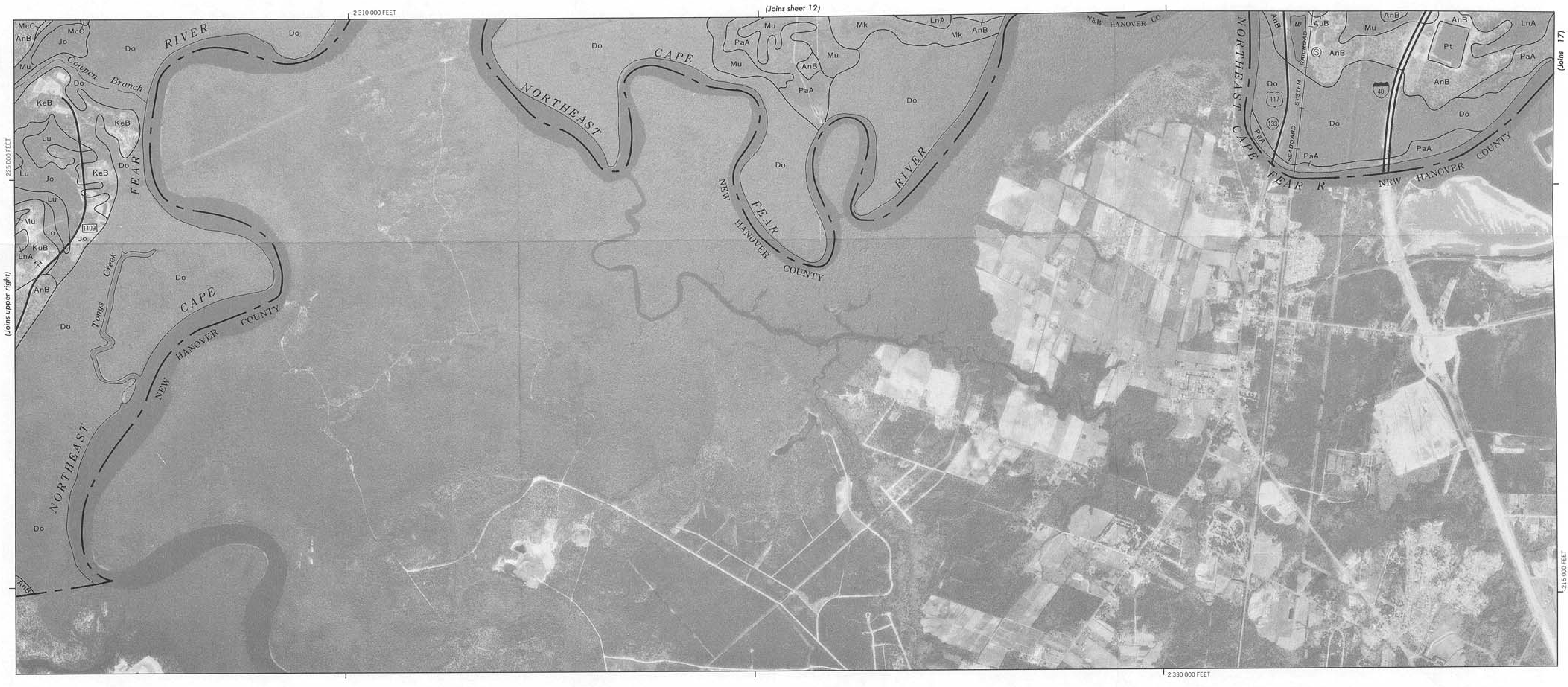
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 16
PENDER COUNTY, NORTH CAROLINA





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5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

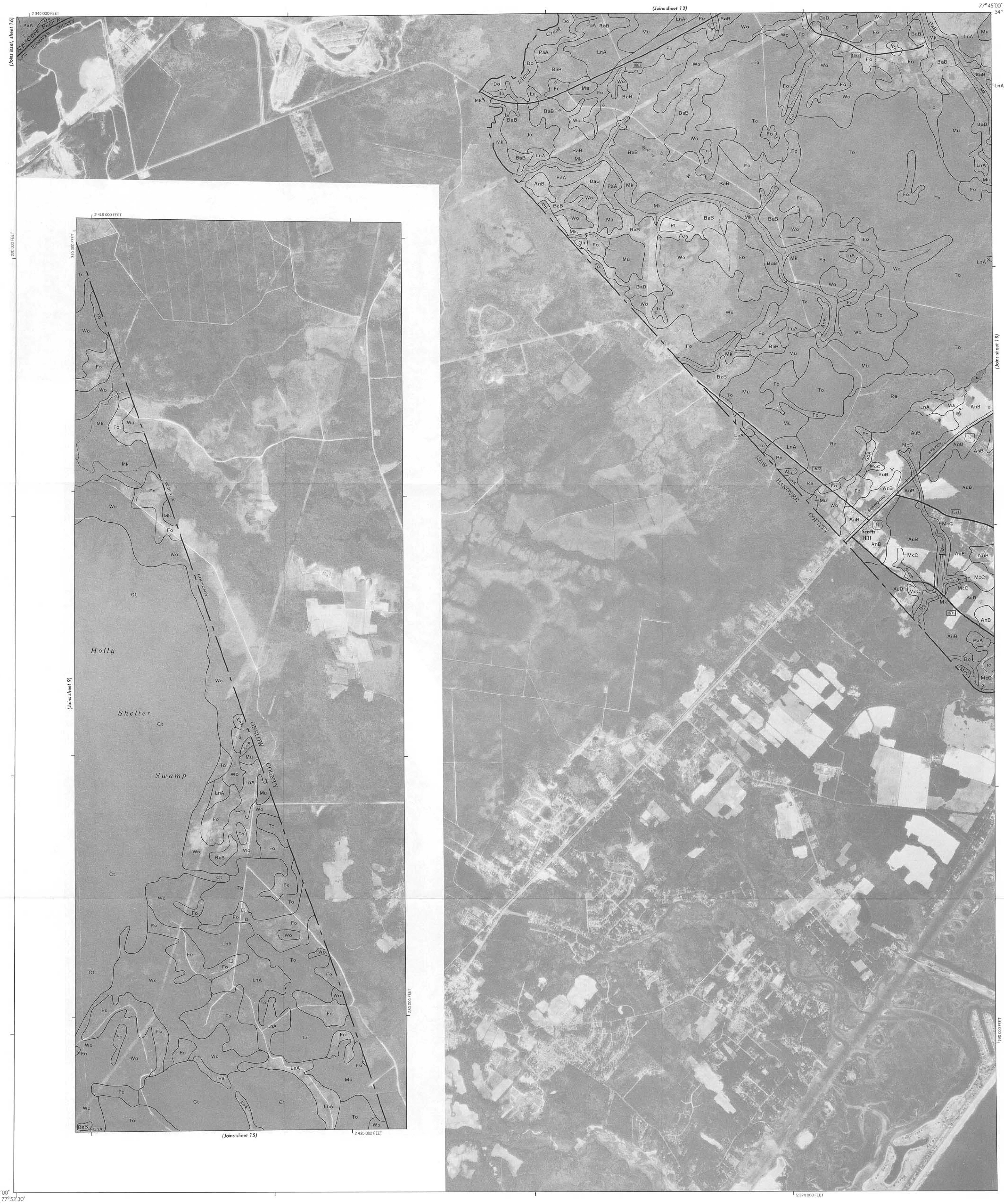
N

PENDER COUNTY, NORTH CAROLINA NO. 16

SHEET NO. 16 O

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 17
PENDER COUNTY, NORTH CAROLINA



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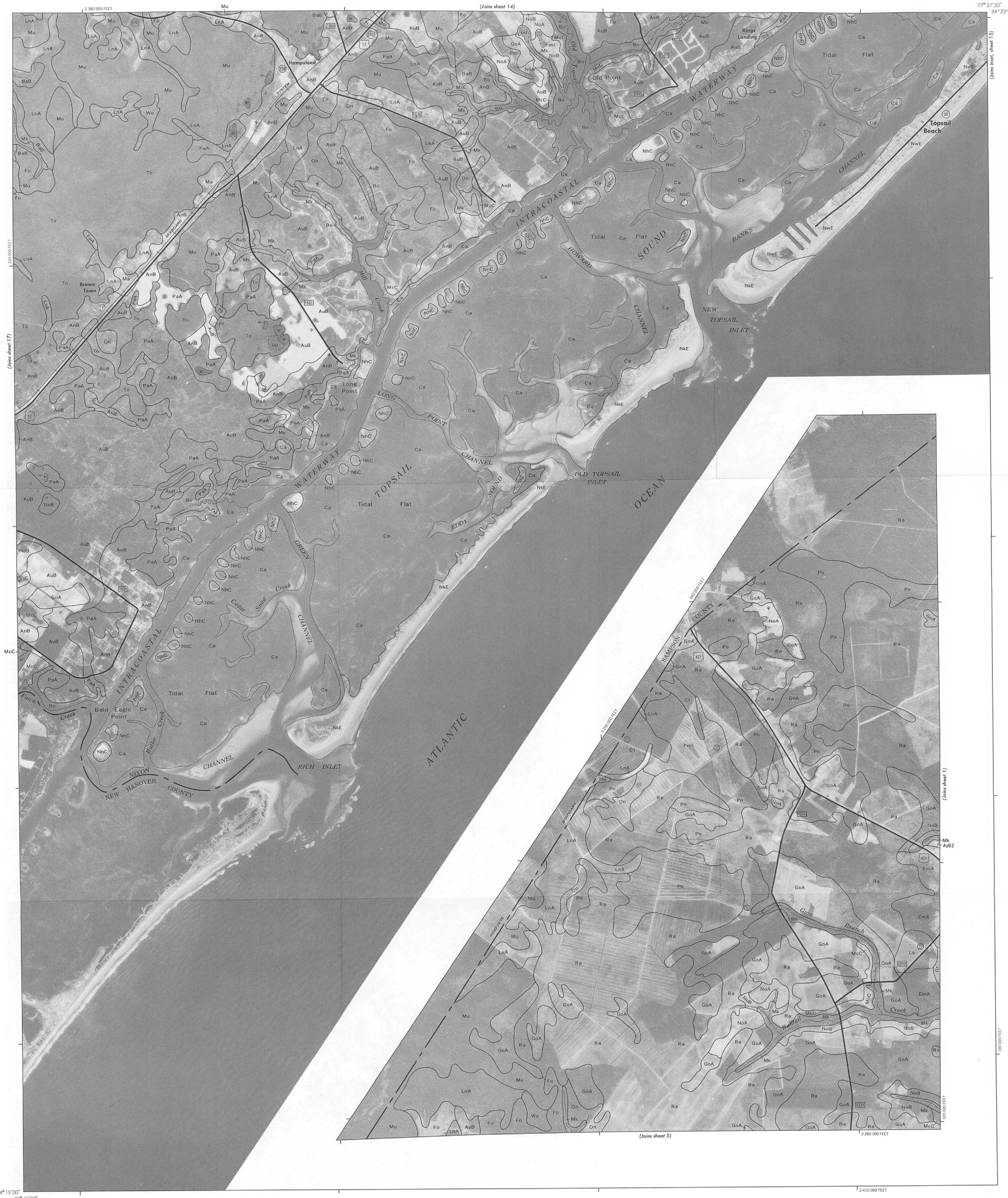
PENDER COUNTY, NORTH CAROLINA NO. 17

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 18
PENDER COUNTY, NORTH CAROLINA



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PENDER COUNTY, NORTH CAROLINA NO. 18